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**UNIFICATION COSTS FOR KOREA AND THE
KOREAN PENINSULA**

by

Donggun Lee

December 2015

Thesis Advisor:
Second Reader:

Robert E. Looney
Robert Weiner

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UNIFICATION COSTS FOR KOREA AND THE KOREAN PENINSULA

Donggun Lee
Captain, Republic of Korea Army
B.S., Korea Military Academy, 2007

Submitted in partial fulfillment of the
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December 2015**

Approved by: Robert E. Looney
 Thesis Advisor

Robert Weiner
Second Reader

Mohammed Hafez
Chair, Department of National Security Affairs

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ABSTRACT

This research begins with two questions: Can the government of South Korea (SK) overcome the economic burden of Korean unification, and what will the effects of reunification be on the United States and China? This thesis focuses on manufacturing, the food industry, and infrastructure, since these three sectors will be the most important expenditures of a unified Korean government. To develop North Korea's (NK's) economy, the development of these three elements is essential; however, private capital and foreign investment will not come easily, because NK is certain to face political and economic instability in the early stages of unification.

By combining SK's technology and NK's cheap labor, Korean unification might start a positive ripple effect throughout the global economy. In addition, the elimination of NK's weapons of mass destruction and nuclear programs will contribute to world peace. In consideration of these effects of Korean unification, this thesis explores the benefits of unification for the two most influential countries in the process: the United States and China. The Koreas must persuade powerful countries that have an interest in Korea by conveying the positive effects of unification.

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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|-------|-------------------------------------------------------|
| BOK | Bank of Korea |
| CCP | Chinese Communist Party |
| DM | Deutsche Mark |
| DMZ | Demilitarized Zone |
| FAO | Food and Agriculture Organization |
| FDI | Foreign Direct Investment |
| FTA | Free Trade Agreement |
| GDP | Gross Domestic Product |
| GNI | Gross National Income |
| GNP | Gross National Product |
| IAEA | International Atomic Energy Agency |
| KAMCO | Korea Asset Management Corporation |
| KIC | Kaesong Industrial Complex |
| KIEP | Korea Institute for International Economic Policy |
| KIET | Korea Institute for Industrial Economics & Trade |
| KINU | Korea Institute for National Unification |
| KRIHS | Korea Research Institute for Human Settlements |
| KRW | Korean Won |
| MNC | Multi-National Corporation |
| NK | North Korea |
| OECD | Organization for Economic Cooperation and Development |
| OPCW | Organization for the Prohibition of Chemical Weapons |

| | |
|------|-------------------------------------|
| PRC | People's Republic of China |
| R&D | Research and Development |
| ROK | Republic of Korea |
| RDA | Rural Development Administration |
| SEZ | Special Economic Zone |
| SK | South Korea |
| SOC | Social Overhead Capital |
| TNC | Trans-National Corporation |
| UNDP | United Nations Development Program |
| USSR | Union of Soviet Socialist Republics |
| WFP | World Food Program |
| WMD | Weapons of Mass Destruction |

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I. INTRODUCTION

A. MAJOR RESEARCH QUESTION

The Korean people wish for their unification; as children, they even sang a song about unification: “The desire for unification that is rooted in a sense of common ethnicity, cultural experience, and historical justice remains strong.”¹ Although there are several military conflicts between South Korea and North Korea, Korea still wants unification.

Since the Berlin Wall came down in 1989, Koreans have seriously dreamed of unification. Kim Il-sung’s sudden death, North Korea’s severe food crisis, and economic troubles gave Korea false hope. As a result, many scholars as well as the government have studied the possibility of North Korea’s collapse and unification scenarios. However, it has been difficult, and remains so now, to perform an accurate study because information about North Korea is limited, and the data is different from each agency. Estimates of the cost of unification vary depending on how the cost is determined; predictions range from \$400 billion to \$3.6 trillion.²

Learning from Germany’s unification, the Korean people have realized that the enormous cost of unification is necessary. While going through the 1997 Asian economic crisis and the 2008 global economic crisis, Koreans have set a higher value on economic problems than any other problem. After the death of Kim Jung-il, they briefly anticipated unification, but Kim Jung-un, a new young leader, seemed to take power successfully. Because of the enormous cost of unification and the unlikelihood that North Korea will suddenly collapse, most South Koreans hesitate to prepare for the unification.

Considering these circumstances, the purpose of my thesis is to determine whether Korea can overcome the economic burden of unification and what the economic effects to its neighbors will be. This research estimates the unification cost in three

¹Joon Seok Hong, “The Economic Costs of Korean Reunification,” *Spice Digest*, Fall 2001, http://fsi.stanford.edu/docs/the_economic_costs_of_korean_reunification.

² Charles Wolf, Jr., “Korean Reunification: How It Might Come about and at What Cost,” *Defence and Peace Economics* 17, no. 6 (December 2006): 686.

sectors: manufacturing, the food industry, and infrastructure. To receive international support, the Koreas should be able to persuade powerful countries that have an interest in Korea by estimating the effect on Koreans and their economy. Although President Park Geun-hye insists unification is a step on the ladder to becoming a more advanced country, most Koreans hesitate because of the expected economic burden. This thesis explores whether South Korea can overcome the economic burden based on current economic data, and it will also try to find the best way to reduce the unification cost. This thesis assumes that North Korea will implode and get absorbed by South Korea; this scenario is less attractive for South Korea, but it may be beneficial to estimate the most expensive scenario. Therefore, Koreans are able to prepare better for unification when faced with a situation that is expected.

B. IMPORTANCE

This thesis provides actual costs to help the Korean people make decisions regarding unification. It also analyzes the effect of unification on neighbor countries—specifically, the United States and China.

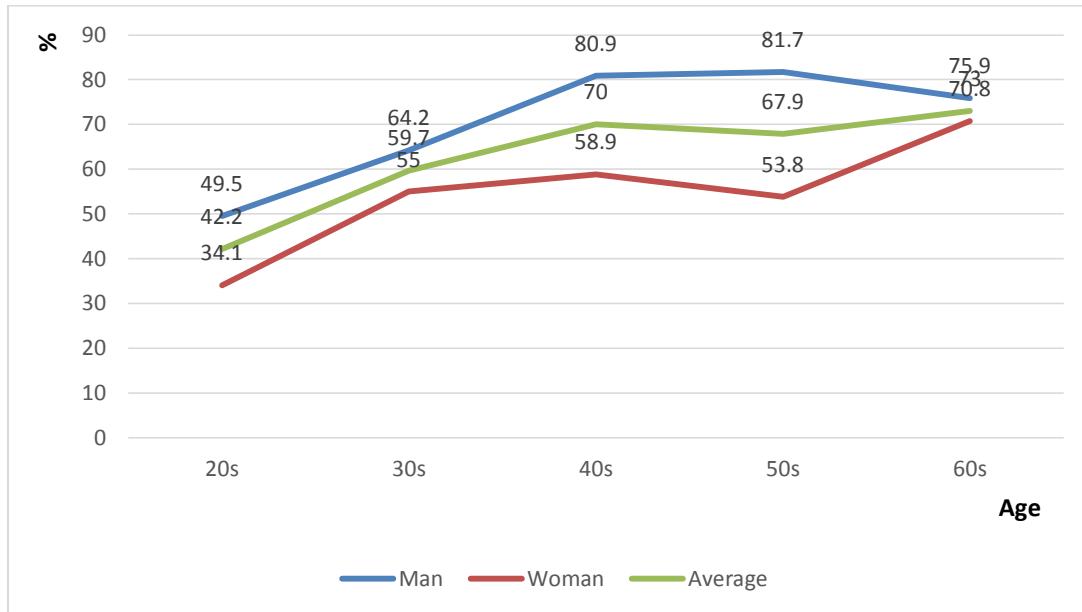
This research estimates the unification cost based on South Korea's budget system, using examples from Germany's unification. Moreover, this thesis assumes that a unified Korea will follow South Korea's budget system and specific bureaucratic programs. Among them, the unification costs of manufacturing, food, and infrastructure sectors will be the most important sectors in the expenditures of a unified Korea government, in order to quickly raise the North Koreans' quality of life and provide the basis for national reconstruction. This is because private capital and foreign investment will not come easily in North Korea in the early phases of unification. Therefore, the guidance of the government will be needed. The success of these sectors will be directly connected to the ability of North Korea to adapt as well as to achieve sustained growth in North Korea.

Based on the six-party talks, unification will be accomplished. After the unification, the international situation around Korea will be totally changed in comparison to the current situation. Although a peaceful atmosphere can be created in the

process of unification, a rising China will continue to be a regional hegemon in Asia; as a result, bipolarity may appear in Northeast Asia, like in the Cold War. Thus, this thesis considers the geopolitical situation around Korea and researches the national interests of two powerful states: the United States and China. By reviewing the interests of powerful countries, the two Koreas will be able to persuade them to support unification by estimating the economic effects and security benefits that will result from unification.

Many Koreans have a positive attitude towards unification. Their thoughts about unification, however, vary depending on age and sex. Although the elderly are hoping to unify, young people, who will be main actors, are largely not interested in it (see Figure 1).

Figure 1. The Proportion of Positive Attitude about Unification by Age and Sex



Source: Kyuryoon Kim and Hyunggi Kim, “Unification Funding and the Perception of Public” (Seoul: Korea Institute for National Unification, last updated February 3, 2015), <http://www.unikorea.go.kr/content.do?cmsid=3096&mode=view&page=2&cid=42534>.

In March 2014, President Park Geun-hye said, “Unification is bonanza.” She insists unification is a step on the ladder to becoming a more advanced country. Through reviewing unification costs and finding the cost reduction measures, this thesis will

provide help to overcome the economic burden that Koreans are expecting. Moreover, the prospect of the international situation in Northeast Asia would help get the support of neighbor countries and contribute to a more peaceful atmosphere in the region.

C. LITERATURE REVIEW

The unification of Germany in 1989 has promoted research to study how Korea will be unified. Scholars have predicted three scenarios of a unified Korea: “unification through system evolution and integration, unification through collapse and absorption, and unification through conflict.”³ Depending on the scenario, they estimated the cost by analyzing the various financial factors of Korean unification. In 1991, the Harvard Institute for Population and Development argued that \$250 billion to \$500 billion would be needed for the Korean unification based on lessons of German unification.⁴ After that, according to various scenarios and diverse definitions of unification costs, economists estimated at \$400 billion to \$3.6 trillion.⁵ Kim Jung-un’s regime seems to be a stable system, so far, despite the worry of surrounding countries; however, Jang Sung-taek and Hyun Young-chul, who was vice chairman of the National Defense Commission of NK and minister of North Korean forces, were executed because of treason. While the complaints of its military are increasing, the number of its defectors are also increasing. Under the U.N. Resolution, NK has lost its friends, such as Libya during the Arab spring and Iran in the Joint Comprehensive Plan of Action. With the international pressure and increasing domestic dissatisfaction, NK’s fate will be collapse. In addition, considering characteristics of modern welfare and the ROK-US alliance, North Korea is less likely to start an all-out war. Therefore, this thesis assumes that the two Koreas will unify through NK’s collapse and absorption into SK. The literature review focuses on three particular literatures—economic statistics, official documents from the Ministry of Unification in SK, and scholarly studies. These concern specific unification cost calculations:

³Wolf, “Korean Reunification,” 683–84.

⁴Dong-ho Cho, *Unification Benefit Is Larger than Unification Cost* (Seoul: Institute for Unification Education, Seoul: Ministry of Unification in Korea, last updated May 2, 2011), <http://www.uniedu.go.kr/uniedu/pds/view.do?atclSn=1246&mcd=MC10001222&currPage=2&listScale=20&pageScale=10&inDivSet=PDS0000121>.

⁵Wolf, “Korean Reunification,” 686.

definitions of unification costs, unification cost for Korea: manufacturing, the food industry, and infrastructure; and benefits of powerful countries.

1. The Definition of Unification Cost for Korea

Before estimating how much unification will cost for Korea, it is necessary to define *unification cost*. Many institutions have presented various unification costs since they have used different methodologies, scenarios, and dates in their models. According to the research of Charles Wolf, Jr., unification cost is defined as “doubling per capita income in the North”⁶ within five years after Korean unification. He insisted that doubling per capita income could “work out its own destiny and its own parities and disparities between income levels and living standards in the North and the South.”⁷ In addition, this research presents “subsequent capital flows between South and North, and between the rest of the world and the North.”⁸ This macroeconomic approach is helpful in estimating the unification cost since Korea will need the help of the international community after unification. This estimate, however, does not show the unification cost by category. A detailed unification cost is required to devise a unification plan and remove confusion after the unification. Furthermore, specific estimates will help guide a unified Korean government, like the example of South Korea in the 1970s. In other words, cost estimates that are broken down by subject fields will help a unified Korea by providing the basis for national reconstruction and give a foundation to increase its quality of life. Consequently, this thesis explores the unification cost by focusing on manufacturing, food industry, and infrastructure from the microeconomic approach.

2. Unification Cost for Korea: Manufacturing, Food Industry, and Infrastructure

The microeconomic approach of unification was mostly developed by the Ministry of Unification in Korea. In 2011, the agency issued a plan to promote Korea

⁶Charles Wolf and Kamiljon T. Akramov, North Korean Paradoxes: Circumstances, Costs, and Consequences of Korean Unification (Santa Monica: RAND, 2005), 46.

⁷Ibid.

⁸Ibid., 47.

economic community; it assumed that the two Koreas would cooperate to develop their economy before unification.⁹ The plan explained the unification cost in four sectors: system integration, market integration, infrastructure integration, and industrial reconstructing. For system integration, the government would have several programs: industrial standard; taxation and finance; converting to capitalism; constructing integration system. For market integration, providing vocational education, subsidizing recruitment, and supporting start-up companies would be included. In the field of infrastructure integration, the government would support transportation and energy installation programs. Lastly, for industrial reconstructing, the government would provide subsidies and taxation exemption in manufacturing, agriculture, and fisheries. This plan would be meaningful because it would provide specific programs to unify the two economies, as well as using a microeconomic approach. It estimated the unification cost that government will spend up to \$21 billion; it insisted that the cost can reduce through cooperation between two Koreas. However, this model does not follow the budget system of South Korea; the reality is lacking. Therefore, a research of unification cost is needed according to the system of South Korea.

After 2011, research focusing on government spending began. In 2013, the Korea Institute for National Unification (KINU) released a study about unification costs and benefits from the perspective of politics, economy, and society.¹⁰ Among them, economic sectors not only included specific programs—as mentioned before—but also followed the budget system of the South. Unlike previous research, KINU researchers assumed that the government of a united Korea would spend up to 5% of the gross domestic product (GDP) of South Korea for 20 years in total unification costs; it is the result derived from the lessons of Germany: “Germany had spent more than 5% of West Germany’s GDP since unification in the early 1990s.”¹¹ In addition, the most important characteristic of KINU’s thesis is that Korea can use 5% of South Korea’s GDP for two

⁹KIEP and KIET, *Korea Economic Community Promotion Initiative* (Seoul: Ministry of Unification, 2011), chap. 4, <http://www.korea.kr/archive/expDocView.do?docId=30610>.

¹⁰Cho et al., *A Research on the Costs and Benefits of Korean Unification: Political, Social, and Economic areas* (Seoul: Korea Institute for National Unification, 2013), 225.

¹¹Wolf, “Korean Reunification,” 685.

decades as its unification cost through reducing defense, decreasing social conflict, and developing market. As a result, this research presented sector allocations of the unification cost in the economy. While KINU provided a realistic model to unify two Koreas, it is plausible for a unified Korea to run into financial difficulties in the process of unification. The model, however, do not expect amount of international economic support, and it optimistically expects to achieve the unification through changes to Kim's regime. To develop the economy, trans-national corporations (TNCs) and the support of powerful countries are necessary for unification. Moreover, in consideration of Kim's recent behaviors, it is not feasible that NK will reform based on system evolution itself. Consequently, this thesis follows some of KINU's assumptions: SK can use 5% of South Korea's GDP for two decades as unification costs; in addition, this research considers the international effects of unification from the perspective of the macroeconomic approach.

3. Benefits of Powerful Countries and the Korean Peninsula

To unify with North Korea, South Korea needs the help of surrounding powerful countries, and two Koreas should be able to persuade powerful countries that have an interest in Korea by estimating economic effect on the Koreans and their economy. Many studies have focused on this area of research already.

Charles Wolf said that “unification would entail major security benefits for the United States in the form of controlled and then terminated WMD programs in the North and elimination of the threat of weapons proliferation to stateless terrorist organizations.”¹² Through unification, cooperation between the concerned countries will increase; there will be an atmosphere of increased reconciliation based on six-party talks in the Far East. On the other hand, if the United States, as the leader of the regional system, is deeply involved in Korean unification, the People’s Republic of China (PRC) will think of Korean unification as a defeat of Communism. Thus, SK government should stress economic benefits for China and get rid of a misunderstanding of PRC’s defeat. As one researcher suggested, “international cooperation between the U.S., China, Japan, and

¹²Ibid., 690.

Russia is highly advisable.”¹³ Considering these potential effects of unification, this thesis explores the economic benefits to China as well as the United States.

As for economic costs, financial support from regional powers, mostly the United States and China, will be needed.¹⁴ Even though estimated costs are high, the benefits for America as well as North Korea will be enormous. The United States can not only enlarge its market, but it can also reduce its trade dependence on China while North Korea is developing its economy in manufacturing. Marcus Noland presented the benefits of unification using computable general equilibrium models (CGE). He argued that trade between the area of North Korea and the United States will be expanded about 70 times.¹⁵ Although Noland’s thesis shows the benefits to the United States, he does not provide an estimate of how much financial support the United States should offer. To determine the suitability of U.S. support and to understand its potential, this thesis explores the costs and benefits of unification to the United States.

For China, Korean unification means two sides of the same coin. In economic terms, Kiejoon Pak argued that “a unified Korea would contribute at least an average of 0.2–0.5% increase in China’s annual GDP.”¹⁶ In addition, many others have argued that the border region’s economy will grow rapidly through Korean unification.¹⁷ On the other hand, unification led by South Korea can be seen as defeat of communism. Furthermore, according to the spread of capitalism and democracy, China will fear a crisis for the communist system and eventually oppose the unification. Consequently, this thesis explores how to strategically approach China regarding its support of unification and to understand China’s security interests.

¹³ Marcin Grabowski, “Korean Unification Prospects and the United States’ Policy,” *Ad American: Journal of American Studies* 14 (2013): 47, ProQuest (1516048014).

¹⁴ Ibid.

¹⁵ Marcus Noland, “A Study to Analyze Cost-Benefits of the Reunification of Korean Peninsula to the United States” (Seoul: Ministry of Unification, last modified February 16, 2015), <http://www.unikorea.go.kr/content.do?cmsid=3096&mode=view&page=&cid=42366>.

¹⁶ Kiejoon Pak, “China’s Cost-Benefit Analysis of a Unified Korea: South Korea’s Strategic Approaches,” *Journal of East Asian Affairs* 26, no. 2 (2012): 45, ProQuest (1322715495).

¹⁷ Shannon Tiezzi, “How China Could Benefit from a United Korea,” *Diplomat*, January 14, 2014, <http://thediplomat.com/2014/01/how-china-could-benefit-from-a-united-korea>.

D. POTENTIAL EXPLANATIONS AND HYPOTHESES

This thesis explores whether South Korea can overcome its economic burden based on current economic data. While Germany spent 5% of West Germany's GDP for five years as its unification cost, a unified Korea will not exceed that of South Korea's GDP. Considering the difference between Germany and Korea, this thesis follows the KINU's assumption, which shows that a unified government will spend its unification cost for two decades after the unification. Since this thesis assumes that North Korea will suddenly collapse and be absorbed by SK, a unified government will suffer a big mess. Thus, this model can minimize adverse effects in the early phases of unification and help remove the economic fear of Korean unification that comes from studying what happened in Germany. As a result, a unified Korea can have confidence and play a leading role in the unification. According to Auerbach's article, "Economic cooperation between the two Koreas can alleviate some of the projected burdens. Reforms of South Korea's fiscal policies take on added importance in light of the large added burdens of reunification."¹⁸ Therefore, this thesis tries to find ways to reduce the unification cost through the example of Kaesong Industrial Complex and research by other relevant scholars.

Korean unification will also influence its neighbor countries. Although the help of international societies will be needed in the early period of unification, gains and benefits of expanded economic transactions will exceed "the abnormal security hazards and costs imposed on the international societies through a divided and unpredictable Korea."¹⁹ This thesis also shows how unification would affect the United States and China from the perspective of security and the economy.

The main hypothesis of this thesis is that the government of a unified Korea can overcome the economic burden in terms of its manufacturing, food industry, and infrastructure. The microeconomic approach will guide the government's preparations

¹⁸Alan J. Auerbach, "The Fiscal Burden of Korean Reunification: A Generational Account Approach" (Berkeley: University of California, Berkeley, Econometrics Laboratory, 2004), <http://eml.berkeley.edu/~auerbach/burden2.pdf>.

¹⁹Wolf, "Korean Reunification," 690.

and help explain how to efficiently provide public goods. This thesis also explores the feasibility of the hypothesis based on the lessons learned from German unification.

E. RESEARCH DESIGN

The research design assesses the empirical evidence for the four potential explanations. This section provides a list of how each of these are tested.

The first potential explanation is that the government of a unified Korea can cover 0.25% of South Korea's GDP over 20 years as the industrial cost of unification, based on the KINU's assumption and the industrial spending of the SK government. Currently, South Korea spends about 5% of its GDP in the industrial sector. When the total unification cost assumes 5% of South Korea's GDP, industrial costs are estimated to be 0.25% of South Korea's GDP. This explanation is tested by analyzing the example of Kaesong Industrial Complex, which is operating 124 South Korean factories in a complex employing about 54,060 North Korean workers near the border as of August 2015.²⁰ Through the establishment of an additional three industrial complexes, the effect of this industry will spread through the North. If the industrial cost is not a burden for South Korea, Korean unification will be achieved more easily.

The second potential explanation is that the government of a unified Korea can cover 0.25% of South Korea's GDP over 20 years as the food cost of unification. South Korea spends about 5% of its GDP in the agriculture, fish, and food sectors. This explanation is tested through a case history assessment of South Korea and through KIEP research. Through subsidies of the agricultural and fishery sectors in South Korea, this thesis assesses the output and effect of the food sector cost of unification.

The third potential explanation is that the government of a unified Korea can cover 0.5% of South Korea's GDP over 20 years as the infrastructural cost of unification. South Korea spends about 7% of its GDP on infrastructure. Since North Korea has outdated infrastructures, this thesis assumes that the infrastructural cost should be

²⁰Kaesong Industrial District Management Committee, "The Enterprise Status," KIC Web, accessed August 21, 2015, <https://www.kidmac.com/kor/contents.do?menuNo=100158>.

increased up to 10% of South Korea's GDP. This explanation is tested through a case history assessment of South Korea in the 1970s and 1980s and through KRIHS research.

The last potential explanation is that Korean unification will greatly help the United States and China in the areas of security and economy. This explanation can be tested by assessing how Korean unification would affect the economy and security of the United States and China and whether or not the benefits that two powerful countries will receive are greater than the costs. It is important to note that the United States will provide enormous support to North Korea in exchange for it giving up nuclear weapons. China will feel the challenge of security and politics due to the changes occurring in North Korea. Consequently, this research explores whether the economic effect for the United States is beneficial enough to justify the costs associated with North Korea's ending its WMD weapon programs as laid out in the Iran deal, and analyzes China's security and political gains.

F. THESIS OVERVIEW

The thesis is organized into five chapters. The first chapter is the introduction, which explains the meaning of unification for Koreans and the past research in Korea. The second chapter presents an overview of North Korea's economy and possible unification scenarios. The third chapter assesses the unification cost in manufacturing, food industry, and infrastructure sectors, and also provides the definition of unification cost using a microeconomic approach. The fourth chapter assesses the costs and benefits of Korean unification to the United States and China, and the concluding chapter describes the implications of Korean unification for powerful countries that have an interest in Korea as well as in two Koreas.

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II. NORTH KOREAN ECONOMY

Except for NK, all communist countries have tried to remove the inefficiency of a planned economy after their nation-building. Within most communist countries, a centralized planned economy seems to have accomplished proper production, use resources effectively, and solve unemployment; however, planned economies have created an inefficient allocation of resources and have eventually led to supply shortages. Therefore, like China, which applied some market functions in a planned economy, communist countries have changed to a modified market economy. NK, however, maintained a centrally planned socialist command system. Despite a severe economic crisis in the 1990s, it still adheres to communist principles. For example, Jang Sung-taek, who is married to the sister of former NK supreme leader Kim Jong-il and vice chairman of the National Defense Commission of NK, established the joint steering committee for developing the Rasin Economic Trade Zone and the Hwanggumpyong and Wihwa Islands Economic Zone with China. His sudden execution, however, stopped NK's cooperation with China and exacerbated NK's economic problems. As a result, NK is more isolated from the world, and its economic reality is drastically different from the paradise which it claims to be. In contrast, SK has achieved outstanding economic development in the same period. After the Korean War, SK was one of the poorest nations in the world. To achieve better living conditions, South Koreans did their best under soft authoritarianism. As a result, they achieved the "Miracle on the Han River" and joined the Organisation for Economic Co-operation and Development (OECD) in 1996. SK's economy is still growing; therefore, the gap between the two Koreas is increasing every year.

A. PAST ECONOMIC POLICIES

In the 1960s, NK had promoted the industrialization process under Kim Il-sung. Thanks to abundant natural resources and cheap labor, it achieved an economic performance that was superior to SK. NK set up three goals that were key to its economic

policies: independent national economic construction, a priority on heavy industry development, and simultaneous development of the military and economy.

1. Independent National Economic Construction

As China's Chairman Mao did, NK wanted to accomplish an independent economic structure using internal resources; it refused to trade despite its comparative advantage. According to NK's dictionary, an *independent economic structure* means “not slaved to others. Based on the resources and power that we hold, economic development is activated by itself.”²¹ In other words, the economy covers the national demand through its own procurement, using its own methods of production.

In the case of China, Mao also argued for independent economic construction in the 1950s. Through the Great Leap Forward, he hoped to “speed the advance toward socialism.”²² The failure of this movement, however, continued China's economic disaster and famine. In agriculture, “misconceived irrigation projects leached nutrients from the soil, and mass mobilization for work projects exhausted and demoralized the people.”²³ In the industrial sector, “serious mistakes were made because the government accepted the exaggerated figures forwarded by overenthusiastic local authorities.”²⁴ These failures were a reason to change the PRC's economic strategy, so Deng Xiaoping carried out the dual-track strategy to introduce capitalist policies and remove collective agriculture.²⁵

On the other hand, despite a severe economic crisis in the 1990s, NK refused to adopt China's strategy since introducing market elements was contrary to communist principles. Until now, the communists of NK argued independent economic construction, but an increasingly severe economic crisis and the gap with SK made its economy open a

²¹Korean Workers' Party, *Economic Dictionary II* (Pyongyang: Social Science, 1985), 208.

²²Conrad Schirokauer and Donald Clark, *Modern East Asia: A Brief History*, 2nd ed. (Boston: Houghton Mifflin, 2008), 363.

²³Ibid., 364.

²⁴Ibid.

²⁵Loren Brandt, Debin Ma, and Thomas G. Rawski, “From Divergence to Convergence: Reevaluating the History behind China's Economic Boom,” *Journal of Economic Literature* 52, no. 1 (2014): 96, doi:10.1257/jel.52.1.45.

little bit. For example, NK established the Rasin-Sunbong Special Economic Zone to attract foreign direct investment (FDI) in 1991. In the 2000s, it had expanded the special economic zone (SEZ) area to Sinuiju, Kaesong, and Mt. Geumgang. Sinuiju area, however, fell through because of non-cooperation from China. The other two were carried out by SK's investment. Jung Ju-young, who is the former chairman of Hyundai and comes from NK, invested in two SEZs with the help of progressive SK presidents. Although the Mt. Geumgang SEZ was stopped by NK's shooting at SK civilians, Kaesong area has been operating well since its establishment in 2002.

In 2013, Kim Jung-un promulgated the economic development act, which establishes 13 provincial economic zones and one national economic zone.²⁶ Conversely, he also argued that its independent economic construction is the only foundation for a socialist victory.²⁷ In other words, this paradox means that NK has difficulty in pursuing reality and ideality at the same time.

2. Priority on Heavy Industry Development

For NK, heavy industry was a foundation of economic development. NK insisted that the industrialization of socialism was accomplished by the fast development of heavy industry.²⁸ This imbalanced growth strategy was also adopted by other communist states. These states pursued rapid production with slogans such as “Catch up with Britain in ten years and catch up with the United States in 20 or more years.”²⁹ To achieve rapid development, NK's communist party guided the development of state enterprises and forced households to reduce consumption. With the increase in savings, the party invested intensively in the defense industry and the production of heavy industry.

²⁶ROK Ministry of Unification, *North Korea Understanding* (Seoul: Institute for Unification Education, 2014), 185.

²⁷Jae-jun Seo, “Kim Says that We Should Not Depend on Foreign Trade,” *News 1 of Korea*, March 31, 2015, <http://news1.kr/articles/?2162601>.

²⁸Korean Workers' Party, *Economic Dictionary II*, 715–16.

²⁹Zhihua Shen and Yafeng Xia, *Mao and the Sino-Soviet Partnership, 1945–1959: A New History* (Lanham, MD: Lexington Books, 2015), 286.

NK has also invested more than 70% of its total investment expenditure budget in its heavy industry.³⁰ Thanks to its investments, NK achieved better economic growth and development than SK until the early 1970s. However, it also suffered from the imbalance of industrial structure, like the failure of China. As time passes, NK's failures in light industry and the stagnation of consumption have worsened.

Heavy industry is closely associated with a state's economic scale. If there is no large market, its ripple effect will be minimal for a long time. In addition, since heavy industry requires a lot of money, its failure will affect a country's economy for a long time. In the case of China, the economic impact of the failed Great Leap Forward movement has lasted for at least two decades. Consequently, NK's failure in the heavy industry sector has worsened its economy despite some economic policies meant to bring about improvements.

3. Simultaneous Development of the Military and Economy

Kim Il-sung insisted that the military and the economy should be developed simultaneously to overwhelm those of SK and to achieve a self-sustaining security. This policy followed that of the U.S.S.R. and China. Despite its small economic size, NK chose this policy; as a result, from 1967 to 1971, the military expenditure of NK was increased about 30%. While many North Korean people cannot eat three meals a day, NK has increased military spending. Despite the shrinking national budget resulting from UN resolutions and the economic crisis, NK has strengthened its military power, including nuclear power.

This simultaneous development is one of the causes distorting NK's economic structure. While NK mostly invested in the defense industry under the direction of Kim Il-sung's military first policy, its industrial structure changed to the military-industrial model. With the decline of light industry, it is hard to distinguish between the defense industry and private industry. For example, NK established small collective factories in the provinces to produce weapons and supplies as well as daily goods. More than 300 of

³⁰ROK Ministry of Unification, *North Korea Understanding*, 190.

these small factories were built in NK, and they can be transformed into military factories in times of emergency.³¹

Since the economic crisis of the 1990s, NK's defense industry has extended to other sectors as well as military in order to obtain additional economic benefits and overcome its crisis. Using the power and privilege of the military, the military economy has maintained its size because it has managed investment funds, cheap labor, and export resources. Thanks to these strong influences, Kim Jung-il gave the military the role of normalizing NK's economy and supporting external activities. NK's military, however, was very corrupt; the lives of ordinary people did not improve.

4. Implementation of Economic Plans

Since the 1960s, NK has promoted four economic plans through which to transition to perfect communism: first seven-year plan (1961–1970); six-year plan (1971–1976); second seven-year plan (1978–1984); and third seven-year plan (1987–1993).³² The plans, however, did not result in the achievement of NK's economic goals (see Table 1).

During the first seven-year plan, NK concentrated on its heavy and defense industry. As a result, its industrial gross national product increased about 3.2 times. On the other hand, independent economic construction without trade and the policy of developing the military and economy simultaneously hindered the achievement of the goals originally planned. Therefore, NK could not finish the plan and set up a buffer of three years (see Table 1).

From 1971, NK tried to be innovative in its industrial technology and increase capital productivity. Innovating in technology through the introduction of foreign loans was a failure since NK could not repay its debt. As NK's economy grew larger, inefficiency was also severe. As a result, NK gave up this plan and set up a buffer of two years (see Table 1).

³¹Kang-taek Lim, *Analysis of Economic Effect of NK's War Industry* (Seoul: Korea Institute for National Unification, 2000), 70–72.

³²ROK Ministry of Unification, *North Korea Understanding*, 191

In 1978, to achieve a self-reliant economy, modernization, and scientific development, NK aimed to accomplish higher production with the help of other communist states: the U.S.S.R and China. They, however, had not supported NK's economic development as requested. The continuous economic crisis and food shortages were a burden for Kim's regime. Therefore, during the 1980s, NK promoted the thrift movement and sought to improve the quality of life (see Table 1).

The third seven-year plan was related to a trade promotion with other communist states. Because of the collapse of the Soviet Union, however, NK could not execute its plan. In addition, from July 1 to July 8, 1989, NK had hosted the 13th World Festival of Youth and Students in response to the Seoul Olympics. In the process, it spent a lot of money constructing a large gymnasium, apartments, and roads. Consequently, the failing economy and declining quality of life of North Korean people were exacerbated (see Table 1).

Table 1. Economic Development Plan of NK from 1961–1993

| Division | Main Content | Goals | Result |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| First Seven-Year Plan (1961–1970) | <ul style="list-style-type: none"> Heavy industry Defense and economy Technology innovation Culture revolution | <ul style="list-style-type: none"> National income 2.7 times Industrial gross product 3.2 times Crop yields 6–7 million tons | <ul style="list-style-type: none"> Industrial gross 3.3 times Machinery and metal growth 18.4% Labor productivity 147.5% Buffer zone: 3 years |
| Six-Year Plan (1971–1976) | <ul style="list-style-type: none"> Socialism complete Accelerating industrialization and innovation Improving the quality of life | <ul style="list-style-type: none"> National income 1.8 times Industrial gross product 2.2 times Crop yields 7–7.5 million tons | <ul style="list-style-type: none"> National Income 1.7–1.8 times Industrial gross 2.5 times Machinery and metal growth 19.1% Labor productivity 155% Buffer zone: 2 years |
| Second Seven-Year Plan (1978–1984) | <ul style="list-style-type: none"> Self-reliance and modernization of NK's economy Expand trade Raise the quality of life Thrift movement | <ul style="list-style-type: none"> National income 1.9 times Industrial gross product 2.2 times Crop yields 10 million tons | <ul style="list-style-type: none"> Industrial gross 2.2 times Electricity growth 178% Crop yields 10 million tons Railway set up 60% Buffer zone: 2 years |
| Third Seven-Year Plan (1987–1993) | <ul style="list-style-type: none"> Self-reliance and modernization of NK's economy Expand trade Innovate technology | <ul style="list-style-type: none"> National income 1.7 times Industrial gross product 1.9 times Agricultural 1.4 times | <ul style="list-style-type: none"> Industrial gross 1.5 times Electricity growth 1.3 times Rural industrial growth 1.7 times Buffer zone: 3 years |

Source: ROK Ministry of Unification, *North Korea Understanding* (Seoul: Institute for Unification Education, 2014), 192.

Similar to the collapse of other communist economies, NK also went through the process of slow growth, recession, and crisis. Furthermore, its military-first policy distorted industrial structure; as a result, even if it had tried to introduce a few market elements, its economy could not have recovered any more.

B. ECONOMIC POLICY OF KIM JUNG-UN REGIME

1. Current Economic Situation

Since NK remains a closed economy, it is not easy to collect exact data. NK intermittently provides information about the economy, so many institutions—including the United Nations (UN), Bank of Korea (BOK), the Central Intelligence Agency (CIA), and so on—assume that they understand the NK economy based on the limited data given to them. In addition, the institutions apply different foreign exchanges; for example, Bank of Korea announces the indicators of NK economy in Korean currency. This thesis uses the data of BOK because it has provided annual NK statistics, a variety of analytical reports, and data to the various agencies.

a. NK Economic Growth Rates

After the collapse of communist states in 1989, the economic growth of NK has continued its trend of negative growth. Since most factories shut down in the 1990s, NK has suffered its worst food crisis. North Koreans called the 1990s the “march of hardships.”³³ Before the collapse of the U.S.S.R., NK imported oil and raw materials from it; as a result, NK’s own productivity deteriorated and was largely dependent on the U.S.S.R. After the collapse of the U.S.S.R., NK’s economy collapsed completely. Although NK recorded positive growth from 1999, this did not fundamentally solve its crisis (see Table 2).

Table 2. NK’s Economic Growth Rate from 1990–2014

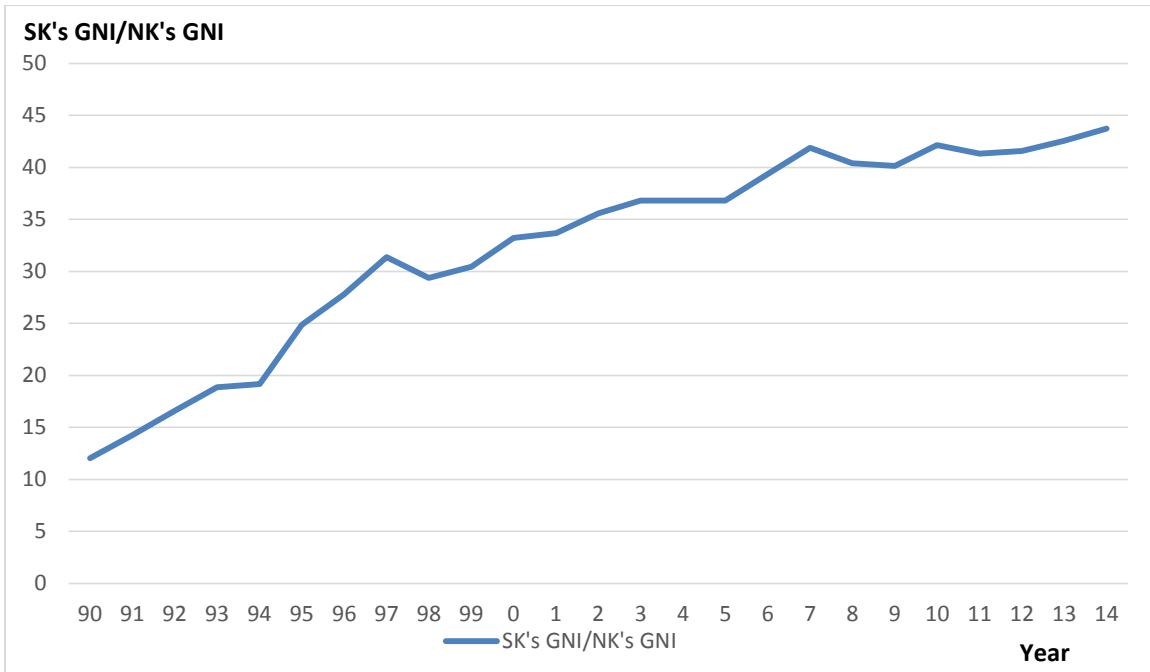
| 90 | 95 | 98 | 99 | 00 | 02 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 13 | 14 |
|------|------|------|-----|-----|-----|-----|------|------|-----|------|------|-----|-----|-----|
| -4.3 | -4.4 | -0.9 | 6.1 | 0.4 | 1.2 | 3.8 | -1.0 | -1.2 | 3.1 | -0.9 | -0.5 | 0.8 | 1.1 | 1.0 |

Source: Bank of Korea, “Economic Statistics System of Bank of Korea,” accessed August 21, 2015, <http://ecos.bok.or.kr>. Numbers are in percentage.

³³Tatiana Gabroussenko, “Calls for Self-Sacrifice in North Korean Creative Writing in the Late 1900s to 2000s,” *Journal of Korean Studies* 13, no. 1 (2008): 36, https://muse.jhu.edu.libproxy.nps.edu/journals/journal_of_korean_studies/summary/v013/13.1.gabroussenko.html.

NK's gross national income (GNI) was 34.2 trillion KRW in 2013; this figure was just 1/43 of the South. Its gross income per capita was 1.38 million KRW; this number was just 1/20 of the South. The economic gap between the two Koreas is increasing every year (see Figure 2 and Figure 3).³⁴

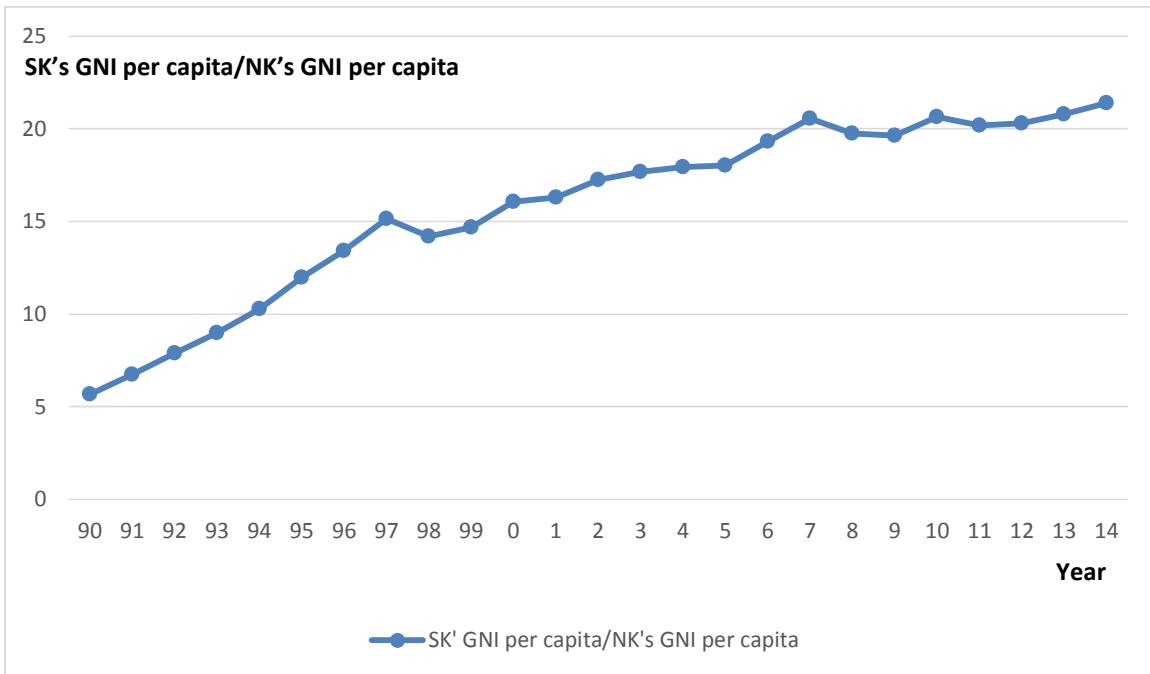
Figure 2. Increasing the Gap of GNI from 1990–2014



Source: Bank of Korea, “Economic Statistics System of Bank of Korea,” accessed August 21, 2015, <http://ecos.bok.or.kr>.

³⁴Ibid.

Figure 3. Increasing the Gap of GNI per Capita from 1990–2014



Source: Bank of Korea, “Economic Statistics System of Bank of Korea,” accessed August 21, 2015, <http://ecos.bok.or.kr>.

b. Finance of NK

The main function of NK’s finance is to distribute its resources in planned economy, control economic agents, and redistribute its income.³⁵ In the case of communist countries, finance’s ratio in their GNPs is high compared with the capitalist countries since states operate state-owned enterprises and manage factors related to the quality of life, such as health, education, and housing. Among communist countries, NK’s figure was high; it was recorded as 90% during 1996–2001 (see Table 3).³⁶

³⁵ROK Ministry of Unification, *North Korea Understanding*, 207.

³⁶Ibid.

Table 3. National Finance of NK from 1990–2014

| | Financial scale (in billion \$) | Exchange (KRW/\$) |
|------|------------------------------------|----------------------|
| 1990 | 16.6 | 2.14 |
| 1994 | 19.2 | 2.16 |
| 1998 | 9.1 | 2.20 |
| 2000 | 9.6 | 2.19 |
| 2003 | 2.2 | 145 |
| 2005 | 2.9 | 140 |
| 2007 | 3.3 | 135 |
| 2009 | 3.6 | 134 |
| 2010 | 5.1 | 101.6 |
| 2011 | 5.8 | 98.3 |
| 2012 | 6.1 | 101.5 |
| 2013 | 6.6 | 99.2 |
| 2014 | 7.1 | 98.4 |

Source: ROK Ministry of Unification, “North Korea Macroeconomic,” North Korea Information Portal, accessed August 22, 2015, <http://nkinfo.unikorea.go.kr/nkp/overview/nkOverview.do?sumryMenuId=EC208>.

During the food crisis of the 1990s, NK’s budget sharply decreased. In 2014, the budget increased up to 7.1 billion dollars, but the budget’s ratio to the GNP was only 20%. In other words, the function of the planned economy is not operating well. Therefore, its national finance depends on a non-planned economy. While some market factors are introduced, the authority adds various taxes. Moreover, it squeezes diverse public goods and military supplies from its ordinary people.

c. NK Industrial Structure

Changes to the industrial structure of NK were different from those of capitalist states. Despite its industrialization, the proportion of agriculture maintained about 25%. This seems like the results of efforts to resolve the food shortage. In fact, in other communist states, the proportion of mining and manufacturing industries has decreased

after their food shortages; that of the agriculture and fishing industries increased (see Table 4).

Table 4. NK's Industrial Structure from 1960–2013

| | 1960 | 1970 | 1980 | 1990 | 1995 | 2000 | 2005 | 2010 | 2012 | 2013 |
|---------------------|------|------|------|------|------|------|------|------|------|------|
| Agri. & Fish. | 28.9 | 21.5 | 20.0 | 26.8 | 27.6 | 30.4 | 25.0 | 20.8 | 23.4 | 22.4 |
| Mine & Manu. | 41.3 | 57.3 | 60.0 | 42.8 | 30.5 | 25.4 | 28.9 | 36.3 | 35.9 | 35.7 |
| Ser. & SOC | 29.8 | 21.2 | 20.0 | 30.4 | 41.9 | 44.2 | 46.1 | 42.9 | 40.7 | 41.9 |

Source: ROK Ministry of Unification, *North Korea Understanding* (Seoul: Institute for Unification Education, 2014), 199. Numbers are in percentage.

NK has introduced a few market factors since the 2000s and established some SEZs near the border; as a result, mine and manufacturing industries have grown slowly. Service and social overhead capital (SOC) sectors are also growing because of investments from China and SK. On the other hand, its agriculture proportion is decreasing.

By comparing the two Koreas' GDPs, it is evident that NK's industry is about 1/60 of SK's industry. NK's companies are highly inefficient, like in other communist countries. Thus, this thesis expects that a unified government will destroy the remnants of NK's economy and restructure its economy based on a new market.

d. Raw Materials Production

The reduced production of raw materials in NK has led to a degradation in industrial competitiveness. In other words, energy shortages have caused reduced operating rates of plants. Because of energy shortages, NK's production of basic raw materials has decreased, and there has been a reduction in intermediate goods, thus leading to a reduction in the production of final goods.

Since the 1990s, the production of raw materials has decreased. Thanks to the economic recovery in the 2000s, NK's production slightly increased, but it seems to be in stagnation again (see Table 5).

Table 5. NK's Raw Materials Production from 1991–2013 (in Million Tons)

| | Iron ore | Nonferrous metal | Steel | Cement | Fertilizer |
|------|----------|------------------|-------|--------|------------|
| 1991 | 8.2 | 0.22 | 3.2 | 5.2 | 0.8 |
| 1993 | 4.8 | 0.16 | 1.9 | 4.0 | 0.9 |
| 1996 | 3.4 | 0.12 | 1.2 | 3.8 | 0.5 |
| 1998 | 2.9 | 0.09 | 0.9 | 3.2 | 0.4 |
| 2001 | 4.2 | 0.09 | 1.1 | 5.2 | 0.5 |
| 2003 | 4.4 | 0.09 | 1.1 | 5.5 | 0.4 |
| 2005 | 4.9 | 0.1 | 1.2 | 5.9 | 0.4 |
| 2008 | 5.3 | 0.09 | 1.3 | 6.4 | 0.5 |
| 2009 | 4.9 | 0.09 | 1.3 | 6.1 | 0.5 |
| 2010 | 5.1 | 0.09 | 1.3 | 6.3 | 0.5 |
| 2011 | 5.2 | 0.09 | 1.2 | 6.5 | 0.5 |
| 2012 | 5.2 | 0.09 | 1.2 | 6.4 | 0.5 |
| 2013 | 5.5 | 0.09 | 1.2 | 6.6 | 0.5 |

Source: ROK Ministry of Unification, *North Korea Understanding* (Seoul: Institute for Unification Education, 2014), 200.

e. *Energy Production*

The energy shortage is one of the main problems preventing NK from increasing the operating rate of its factories and thus recovering its economy.³⁷ Although NK has tried to resolve this problem, the results of its efforts have not been reflected in the economy.

During the Cold War, NK imported cheap crude oil from U.S.S.R. After the collapse of the U.S.S.R., however, it needed to pay money based on regular market prices. Due to a foreign currency shortage, it was difficult for NK to import crude oil. As a result, it started to import oil from China. China, however, was also requesting market

³⁷Ibid., 201.

prices, so NK has imported a minimal amount of crude oil from China and has suffered energy shortages for over two decades (see Table 6).

As NK could not get the crude oil it requested from China, it focused on increasing its own coal production. This production, however, could not recover the production levels of 1990. With NK's industrialization, it has concentrated on the production of coal. As a result, it has been difficult to mine coal using only manpower anymore. Moreover, the obsolescence of equipment, lack of investments, and limited material supply have preventing an increase in coal production. Constant flooding has also destroyed its mines.

The decrease of crude oil and coal caused NK's electric power shortages. As it became worse, NK started to construct small and medium-sized hydroelectric power plants in the late 1990s. Since 2000, it has also continued to build medium and large-sized plants. Therefore, the electric production has slightly increased (see Table 6). However, the plants have not worked properly due to the shortage of technology and parts. NK has tried to introduce alternative energy, but it is difficult without the help of the international community. Thus, to improve its energy production, a unified Korea needs to devise a comprehensive energy development plan.

Table 6. Energy Supply of NK from 1992–2013

| | 92 | 94 | 96 | 98 | 00 | 02 | 04 | 06 | 08 | 10 | 12 | 13 |
|-------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Coal (in million tons) | 29 | 25 | 21 | 19 | 23 | 22 | 23 | 25 | 25 | 25 | 26 | 26 |
| Oil Imp. (in million barrels) | 11.1 | 6.6 | 6.9 | 3.7 | 2.9 | 4.4 | 3.9 | 3.8 | 3.9 | 3.9 | 3.8 | 4.2 |
| Elect. (in billion kWh) | 24.7 | 23.1 | 21.3 | 17.0 | 19.4 | 19.0 | 20.6 | 22.5 | 25.5 | 23.7 | 21.5 | 22.1 |

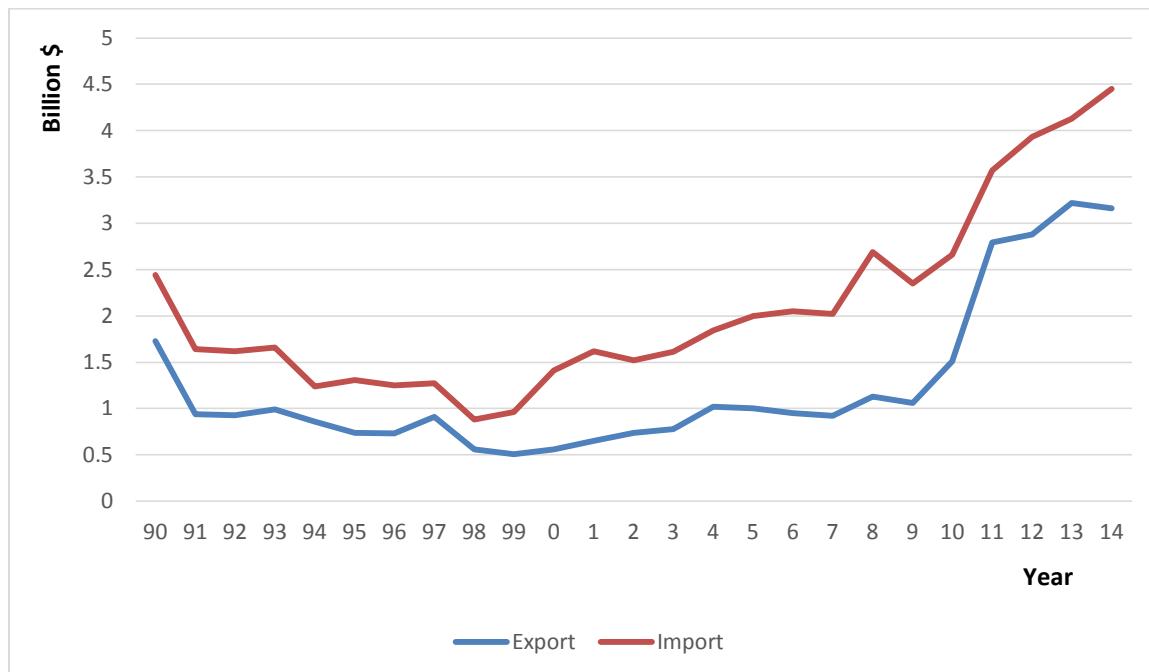
Source: Statistics Korea, Korean Statistical Information Service (database, accessed August 21, 2015), http://kosis.kr/bukhan/statisticsList/statisticsList_01List.jsp?parentId=101_101BUKHANB01.1;101_101BUKHANB01_AA19.2;101_101BUKHANB01_AA19.3#SubCont.

f. Foreign Trade

The main economic policy of NK has been the development of self-reliance. Since the U.S.S.R. provided strategic materials, NK did not feel the need to change this policy. After the collapse of the U.S.S.R, however, trade between the two countries sharply declined, and NK was left without the support of its trade relationship with the U.S.S.R (see Figure 4).

After 1999, NK's trade volume grew rapidly (see Figure 4). With the economic growth of China, NK has increased trade with China around the border. Establishing SEZs is one of the causes of increased trade. The increase in trade, however, has not been associated with an economic recovery. Rather, the trade dependence on China has made the economy worse, and its trade balance has worsened.

Figure 4. Foreign Trade of NK from 1990–2014 (in Billion \$)



Source: Bank of Korea, "Economic Statistics System of Bank of Korea," accessed August 21, 2015, <http://ecos.bok.or.kr>.

After NK's provocation to the South in 2002, the battle of Yeonpyeong, trade dependence on China sharply increased (see Table 7). This is due to the following

reasons. First, as China's has had an increased demand for raw materials, NK has exported its underground resources. Second, NK had introduced limited market factors in its economic system. Thus, Chinese industrial products have dominated NK's market. Third, because of its provocation against SK, the sanctions of the international community have been strong. Therefore, NK has naturally focused on China, and China has relied on the support of NK to develop its northeast region, Manchuria.

Table 7. NK's Trade Dependence on China from 1999–2013

| | 1999 | 2001 | 2003 | 2005 | 2007 | 2009 | 2010 | 2011 | 2012 | 2013 |
|----------------|------|------|------|------|------|------|------|------|------|------|
| Dependence (%) | 25.0 | 32.5 | 42.8 | 52.6 | 67.1 | 78.5 | 83.0 | 89.1 | 88.3 | 89.1 |

Source: Bank of Korea, "Economic Statistics System of Bank of Korea," accessed August 21, 2015, <http://ecos.bok.or.kr>.

The continuous trade deficit is a serious problem for NK. While its economy is slowly recovering, the market is sharply expanding. Consequently, Chinese products account for most of its market. NK has imported a diverse array of items, from raw materials to electronics. Because its industrial competitiveness is very weak, however, NK authority has focused on environmental resources, such as mineral, animal, and fish. Therefore, a unified government should foster its export industry and radically change its industrial structure.

g. Food Production

Like the cause of agricultural failure in other communist states, NK has also managed collective farms. Although agricultural production did not meet its demand every year, food shortages were not a big issue for NK until 1990. This was because it had small populations compared with other states and because it received support from other communist states.

On the other hand, because of the reduction of foreign supply, the decrease of agricultural commodities production, and constant natural disasters, NK faced a serious

food shortage in the 1990s (see Table 8). This period was a hard time for North Koreans; they called the 1990s the “march of hardships.”³⁸

Since 2000, ROK’s fertilizer aid from its Sunshine Policy,³⁹ support from the international community, and efforts from NK’s authority have led to an increase in food production (see Table 8). Furthermore, Kim’s regime has taken 0.2–0.3 million tons of foods from China every year.⁴⁰ Therefore, its food shortage seems to be solved for the present.

Table 8. Food Production and Shortages of NK from 1995–2013 (in Million Tons)

| | 95 | 97 | 00 | 02 | 04 | 06 | 08 | 10 | 11 | 12 | 13 |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Demand | 5.3 | 5.3 | 5.2 | 5.4 | 5.5 | 5.6 | 5.4 | 5.5 | 5.4 | 5.4 | 5.4 |
| Last Year Product | 4.1 | 3.7 | 4.2 | 4.0 | 4.3 | 4.5 | 4.0 | 4.1 | 4.3 | 4.5 | 4.8 |
| Shortage | 1.2 | 1.6 | 1.0 | 1.4 | 1.2 | 1.1 | 1.4 | 1.3 | 1.1 | 0.9 | 0.6 |

Source: Bank of Korea, “Economic Statistics System of Bank of Korea,” accessed August 21, 2015, <http://ecos.bok.or.kr>.

Many institutions, however, have raised questions about its food shortage problem. This is because there are distortions in the distribution system, severe corruption, and a crackdown on the market. In fact, after the currency reform in November 30, 2009, food prices sharply increased. Thus, poverty has increased, and the authorities are not able to resolve the problem. In fact, although the agricultural shortage was recently reduced, the proportion of undernourished Koreans did not sharply decrease. According to the Food and Agriculture Organization (FAO) of the UN, 32% of the North Korean population is still undernourished.⁴¹

³⁸Gabroussenko, “Calls for Self-Sacrifice,” 36.

³⁹The policy was to soften NK’s attitudes towards SK by supporting economic assistance and encouraging conversation between the two Koreas.

⁴⁰ROK Ministry of Unification, *North Korea Understanding*, 205.

⁴¹ESS, ‘Democratic People’ Republic of Korea: Prevalence of Undernutrition” (Rome: Food and Agriculture Organization of the United Nations, accessed August 21, 2015), http://faostat.fao.org/CountryProfiles/Country_Profile/Direct.aspx?lang=en&area=116.

After Kim Jung-un took office in 2011, NK adopted incentives to increase production in collective farms. Excess production, however, should still be sold to the states, and the organization of collective farms has continued operating. If NK does not dismantle it, like China, the food problem is expected to continue. Consequently, breaking up its collective farms is the first priority for a unified Korea.

2. Economic Policy of Kim Jung-un

Kim Jung-un argued that NK should develop the economy and nuclear force simultaneously. While following his father's policy, he thinks that the nuclear force leads to economic development as well as scientific advances.

In 2013, he announced a new economic management system. It contains some efforts to improve market efficiency through changing its distribution system and national economic plan. In addition, it has expanded the autonomy of state-owned enterprises. The most important thing about this system is the change of its distribution of excess productions in agriculture and business. It means that excess productions can be handled in the market, and the authority concedes its market function to some extent. This action may have the purpose of raising productivity through its market function. However, it cannot make a significant amount of money since it is ineffective, and people do not use official markets because of diverse taxes. Conversely, black markets are expanding.

Without giving up its nuclear weapons, NK cannot achieve economic development. Although Kim has received a lot of help from China, international sanctions and improving relations between ROK and China are a burden for him. In contrast, "Xi has yet to meet Kim Jong-un, nor has Kim been invited to visit China since assuming top leadership."⁴² The change of relationships with China and NK will exacerbate NK's economic problems. As a result, Kim's economic policy will fail, and NK will expand its SEZs to attract foreign investment.

⁴²Jonathan D. Pollack, "Is Xi Jinping Rethinking Korean Unification?," presentation at the 3rd Korea Research Institute for Security-Brookings Joint Conference, Seoul, Korea, January 20, 2015, <http://www.brookings.edu/research/presentations/2015/01/20-xi-jinping-korean-unification-pollack>.

C. CONCLUSION

The Kim regime has a task of resolving its long-lasting economic crisis. To solve the problem, NK should be incorporated into the world market and establish an economic development strategy with FDI. Its past failure means that NK's closed economy and brinksmanship are not a good solution anymore. In addition, during the march of hardships, large-scale famine took between 200,000 and 3.5 million human lives, and human rights also were in danger.⁴³ Nevertheless, the Kim regime has enjoyed luxuries. Although NK considers that maintaining its system is the most important value, it cannot overcome its economic crisis without an open-door policy. Thus, SK should find a method to draw NK into the international community. In the long-term, increasing exchanges between the two Koreas would lead to Korean unification. German unification demonstrated that well-prepared unification would reduce the unification cost and social chaos. In this context, the unification cost would result in a benefit to the SK government; the next chapter explores how much unification will cost Korea.

⁴³Gabroussenko, “Calls for Self-Sacrifice,” 40.

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III. KOREAN UNIFICATION COST

A. RESEARCH METHOD

Economists have different estimates of the cost of unification. Some economists estimate the cost as twice the GDP of NK. This chapter, however, estimates that the cost as NK would catch up to the current economic level of SK. Although NK may contribute some money toward the unification, NK's national finances are in very poor shape. Thus, NK will not be able to contribute much to the cost of unification, and the budget of a unified government will mostly come from South Korea.

Among the diverse sectors in NK's economy, this chapter focuses on three important elements: manufacturing, the food industry, and infrastructure. These elements cannot be privatized in the early unification period. A unified government needs to establish these sectors to improve NK's economy. After German unification in 1989, many institutions carried out research on Korean unification based on the lessons of German unification; however, they estimated very different unification costs since they used different methodologies, scenarios, and data in their models. In the case of Germany, it spent more than 5% of West Germany's GDP in the early 1990s.⁴⁴ Therefore, the SK government has also made 5% of its GDP a baseline cost of unification. The situation in Korea, however, is a little different: "For example, East Germany's population was about one-quarter that of West Germany in 1990, While NK's population is about one-half that of SK; East Germany's GDP was about 8–9% of West Germany's, whereas NK's economy is only between 3% and 5% of SK's."⁴⁵ Consequently, the unification cost in Korea will be more than expected.

This chapter uses a microeconomic perspective for estimating the amount of money that SK government would be required to pay. Through estimated unification costs based on relevant scholarss research and SK's examples, this chapter explores

⁴⁴See Jorg Bibow, "The Economic Consequences of German Unification: The Impact of Misguided Macroeconomic Policies," *Levy Institute Public Policy Brief* no. 67 (2001): 67, <http://www.levyinstitute.org/pubs/hili67a.pdf>.

⁴⁵Charles, "Korean Reunification," 685.

whether the SK government is capable of dealing with unification. Furthermore, this chapter explores ways to reduce the cost by looking at past cases in SK.

B. MICRO APPROACH

The Ministry of Unification in Korea mostly relies on the microeconomic approach to unification. Most reports argue that the two Koreas should cooperate to reduce the unification cost before unification occurs. Kim Jung-un, however, has followed his father's senseless policies and sometimes has shown more strident action than his father did. Therefore, the possibility of cooperation between the two Koreas is low.

Unification costs can be divided into two parts: investible spending and consumption.⁴⁶ Investible spending is able to directly promote economic growth; consumption is used by people to raise the quality of life. For example, investible spending includes subsidies of agriculture and industries and the costs of building infrastructure; consumption includes the costs of education, welfare, and public administration. Based on the German experience, consuming spending did account for a large proportion of unification costs. Consuming spending, however, would be decided by political debates in the SK's National Assembly.

In addition, investible spending is necessary to restore NK's economy and attract FDI in the early stage of unification. The expenditure will rapidly increase NK's GDP and lead to a North Korean boom. Even so, NK people are certain to feel envy and jealousy at the development of SK. Thus, efforts to raise the quality of life are important. Manufacturing, the food industry, and infrastructure are the foundation for enriching the lives of North Koreans, as well as recovering NK's economy. Furthermore, the government can easily attract FDI of multi-national corporations (MNCs) through providing a framework for industry. These three elements would lead to the development of a service industry. As a result, success in these three elements would have a significant

⁴⁶Kyuryoon Kim et al., *New Approach to the Costs/Benefits of Korean Unification: Adopting Comprehensive Research Factors and Seeking Alternatives* (Seoul: Korea Institute for National Unification, 2011), 18.

impact on the success of economic development as well as adapting to the market economy in NK.

C. EXPECTED UNIFICATION TYPE AND SCENARIO

The unification type is an important factor when defining cost and benefits. After Germany's unification in 1989, East Germany received the benefits of social welfare equal to West Germany⁴⁷; as a result, the unification cost was more than expected. If a unified Korea slowly increases its social welfare, it will be able to lighten its economic burden. Thus, this thesis suggests restricting North Koreans' movement to the South in the early unification period. Since the labor cost is low in NK, labor-intensive industry will be developed; employment will increase. After the unification, labor costs will change. South Korean labor cost will be maintained or will rise slightly. Conversely, North Korean labor costs will increase every year. Today, North Korean workers' wages are rising about 5% annually in Kaesong Industrial Complex. To slow the rising labor costs and decrease the cost of social conflict, a unified government should limit the movement between two Koreas except SK businessman in the early unification.

Unification is likely to come about in one of three basic ways. South Koreans hope for peaceful unification based on gradual changes in NK. The SK government has also made an effort to achieve a gradual change in NK. Through six-party talks, the government seeks to achieve denuclearization of NK. If the negotiation succeeds, NK's opening will be accelerated. The failure of the Agreed Framework in 1994 provided a lesson to Seoul. In order to not repeat its failure, international communities as well as Seoul are trying to find a peaceful and fundamental solution while leading NK's change. However, some political scholars argue that "NK was cheating both before and after the signing of the Agreed Framework."⁴⁸ Despite the financial support of the Sunshine Policy, Kim's regime has not changed. Thus, history shows how little interest Kim has

⁴⁷Cho et al., *A Research on the Costs and Benefits*, 242.

⁴⁸Sue Mi Terry and Max Boot, "The Wrong Lessons from North Korea," *Foreign Affairs*, April 22, 2015, <https://www.foreignaffairs.com/articles/north-korea/2015-04-22/wrong-lessons-north-korea>.

shown in reform.⁴⁹ The second scenario is that two Koreas will achieve their unification through conflict. For example, NK attacks SK over trivial issues, and the ROK army and U.S. forces destroy the NK regime. This is the worst scenario for Koreans. To avoid military conflict, it is expected that the two Koreas will cooperate and compromise because the second Korean War would be a disaster for everyone, as well as lead to Kim's destruction. The third scenario is also less attractive for Koreans: NK collapses and is absorbed by SK. Because of its suffering from economic burdens and social pressures, NK is likely to collapse suddenly. This scenario, however, is more feasible since Kim Jung-un does not show a will to change NK. Moreover, an increasing number of North Korean defectors shows that the complaints of the people are increasing against Kim's regime. Thus, this thesis assumes that unification will be achieved through collapse and absorption.

D. EXPECTED TIME OF UNIFICATION

Because of SK's inflation rate, the time of unification is also important. As shown in Figure 2, the GNI per capita of South Korea is 21.4 times more than that of North Korea in 2014. The gap is increasing every year. As a result, its unification cost will increase each year if unification is delayed.

The Ministry of Unification in SK made a gradual unification scenario in 2011.⁵⁰ It explained the unification divided by time of unification: unification in 2020 (short-type), unification in 2030 (medium-type), and unification in 2040 (long-type). These scenarios are based on resolving the nuclear issue and getting more deeply involved between the two countries.

This thesis assumes unification will be accomplished around 2030. Since Kim Jung-un safely rules over NK and the North Korean people still do not have the power to change, the short-type is not a reasonable scenario. On the other hand, the expected

⁴⁹Sue Mi Terry, "A Korea Whole and Free," *Foreign Affairs* 93, no. 4 (2014), <https://www.foreignaffairs.com/articles/asia/2014-05-29/korea-whole-and-free>.

⁵⁰KIEP and KIET, *Korea Economic Community Promotion Initiative*, 550.

unification cost in 2040 based on current data will make this an inaccurate possibility. Therefore, the medium-type is more correct and more possible.

E. EXPECTED EXPENDITURES OF A UNIFIED KOREA'S GOVERNMENT

1. The Budget System of SK

Since the SK government will become the main agent of unification based on its economic advantage, the government of a unified Korea will follow the budget structure of SK. In 2015, the SK government has spent \$343.4 billion—the basic exchange rate is 1,100 KRW to the dollar, and it spends in 12 divided sectors: research and development (R&D); industry; social overhead capital (SOC); agro-fishery market; health, welfare, and employment; education; culture, sports, and tourism; environment; military; foreign affairs; public order and safety; and public administration (see Table 9).⁵¹ R&D, industry, SOC, and agro-fishery market can be included in investible spending since these sectors tend to support the economic activities directly. In the early stages of economic development in SK, these sectors mostly depended on government expenditures since private capital could not provide much profit and initial facility costs were large. Today, these sectors represent 21% of the total expenditure of SK's government (see Table 9). R&D expenditure, however, will not be necessary for NK during the early unification. Therefore, this thesis considers R&D as part of industrial costs.

⁵¹ROK Ministry of Strategy and Finance, “The Budget of Korea in 2015,” ROK, accessed March 19, 2015, <http://www.budget.go.kr/front/web/datas/budget2015.do?mode=intro>.

Table 9. SK's Budget in 2015

| | Money (in billion \$) | Weight (percentage of budget) |
|---------------------------------|--------------------------|----------------------------------|
| Health, Welfare, and Employment | 105.2 | 30.6 |
| Education | 48.1 | 14.0 |
| Culture, Physical, and Tourism | 5.5 | 1.6 |
| Environment | 6.2 | 1.8 |
| R&D | 17.2 | 5.0 |
| Industry, Energy | 14.9 | 4.3 |
| SOC | 22.5 | 6.6 |
| Agriculture, Fish, and Food | 17.5 | 5.1 |
| Defense | 34.1 | 9.9 |
| Diplomacy and Unification | 4.1 | 1.2 |
| Public Safety | 15.4 | 4.5 |
| Public Administration | 52.7 | 15.4 |
| Total | 343.4 | 100.0 |

Source: ROK Ministry of Strategy and Finance, “The Budget of Korea in 2015,” ROK, accessed March 19, 2015, <http://www.budget.go.kr/front/web/datas/budget2015.do?mode=intro>.

2. Investible Funds of a Unified Government

As Germany invested 5% of West Germany’s GDP while Germany maintained financial stability in the early stages of unification, SK would also set up a guideline for investing 5% of its GDP. The government can afford the money through a reduction in defense spending, a reduction in agricultural and fisheries subsidies, and cost savings in social conflict. Korean scholars argue that the two Koreas consumed too much money defending the demilitarized zone (DMZ) on defense.⁵² For example, in 1997, Dong-ho Cho gathered data about national income, territory, and populations of 150 countries and derived a formula of reasonable military expenditure in the Korean peninsula; he also calculated the opportunity costs incurred by dividing the two Koreas. As a result, in 1995, the two Koreas wasted \$21.8 billion compared to equipping reasonable forces.⁵³

⁵²Dong-ho Cho, The Economic Cost and Benefit of Unification, in *Division Cost and Unification Cost* (Seoul: Korea Institute of National Unification, 1997), 58.

⁵³Dong-ho Cho, *Unification Benefit Is Larger than Unification Costs*, 73.

In consideration of Germany's experience and the situation in Korea, it would be more effective for Korea to extend support for a period, rather than spending a large amount of money in a short time. In doing so, SK would be able to overcome its economic burden, and NK would receive stable support for a long time. Therefore, this thesis assumes the supporting period to NK to be 20 years.

In this regard, a unified government will be able to pay \$352.5 billion in nominal cost in manufacturing and in the food industry for 20 years, which means \$163.3 billion in real cost. In addition, it will pay \$705 billion in nominal costs in infrastructure, which means \$326.6 billion in real cost. This chapter compares estimates with the SK budget to determine what the country can afford. Thus, the results indicate whether ROK can overcome the burden that will arise from the unification.

F. MANUFACTURING

After the unification, one Korea should focus on the development of manufacturing business in order to speed economic growth.⁵⁴ The manufacturing industry can make a profit faster than any other industry. NK's manufacturing industry has outdated equipment; SK's firms and transnational corporations should establish new manufacturing businesses. In addition, a unified Korea should develop trade relations and supply energy needed to develop industry. To set up infrastructure, the Kaesong Industrial Complex, an investment of \$863 million by SK, is a good example to look at when estimating cost. In SK, the Ministry of Trade, Industry, and Energy deals with the industrial sector, so this thesis uses their estimate.

1. Analysis of SK's Industrial Budget

SK needs to spend a certain amount of money to install a foundation of industry in NK; it would spend it based on the current financial system, and NK would also follow the system to attract private capital and FDI. Table 10 is an industrial budget outline of

⁵⁴Moonsung Kang et al., *Gradual Economic Integration between South and North Korea and Economic Cooperation in Northeast Asia* (Seoul: Korea Institute for International Economic Policy, 2014), 70, http://www.kiep.go.kr/skin.jsp?bid=pub_main_view&grp=publication&num=186051&page=&tabValue=2.

SK in 2015; it consists of six programs: industry promotion, finance support, technology support, industry general, attracting trade and investment, and developing energy and resources. This chapter adds industrial complex support of SOC; thus, SK's industrial budget consists of seven programs in this chapter.

Table 10. SK's Industrial Budget Outline in 2015

| Classification | Money (in million \$) | Weight (percentage of budget) |
|------------------------------|--------------------------|----------------------------------|
| Industry Promotion | 7,836.9 | 49.6 |
| Finance Support | 1,380.7 | 8.7 |
| Technology Support | 1,122.2 | 7.1 |
| Industry General | 515 | 3.2 |
| Trade Promotion | 526.2 | 3.3 |
| Develop Energy and Resources | 3,612 | 22.9 |
| Industrial Complex Support | 809.3 | 5.2 |
| Total | 15,802.3 | 100.0 |

Source: ROK Ministry of Strategy and Finance, "Summary of Budget for FY2015," Seoul: ROK, last modified January 30, 2015, <http://www.korea.kr/archive/expDocView.do?docId=35932>.

Since SK is an export-oriented industrial country, industry promotion is the most important sector. This sector has various programs, and it can be divided into four categories: promote the macro economy, encourage business start-ups, technological and intellectual property, promote major and new industries (see Table 11). After unification, the importance of promoting macro economy and encouraging business start-ups would increase, but existing businesses would relatively decrease since SK technology would substitute these functions of NK.

Finance and technology support have programs for small business; these programs need to establish an industrial base in NK. Thus, a unified Korea would maintain these programs, but various administrations would be needed. Attracting trade and investment is very important for a unified Korea since rapid development can reduce the unification cost and the budget of SK cannot bear all these costs alone. With the smart grid technology of SK, NK can install an electrical grid. Because of the danger of nuclear power, NK would use its steep mountains, strong winds, and underground resources.

Industrial complex programs should be increased to develop the North. Finally, the government should restructure state-owned enterprises in NK. Most enterprises would be removed; the government would share handling expenses with the private sector. Some of the expense would be charged to private enterprises, but most expenses would be paid by the government.

Table 11. SK's Industrial Program

| Classification | Program | |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Industrial Promotion | <ul style="list-style-type: none"> · Macro economy promotion · Make an environment of business start-up · Promote major industries · Develop the capability of industrial R&D · Support traditional market and small business · Promote new industries | <ul style="list-style-type: none"> · Local economy promotion · Attract foreign investment · Make a foundation of industrial capability · Promote industrial technology · Make a foundation of intellectual property · Provide technology standard |
| Finance Support | <ul style="list-style-type: none"> · Support business start-up · Support credit guarantee of small business | <ul style="list-style-type: none"> · Support constant development of small business |
| Technology Support | <ul style="list-style-type: none"> · Support technical development of small business | <ul style="list-style-type: none"> · Support the infrastructure of technical development |
| Industry General | <ul style="list-style-type: none"> · Support administration of small business · Support the Ministry of Knowledge and Economy | <ul style="list-style-type: none"> · Support total administration about intellectual property |
| Trade Promotion | <ul style="list-style-type: none"> · Promote trade · Support small business to export the items · Activate exportation | <ul style="list-style-type: none"> · Set up the foundation of marketing · Trade relief |
| Develop Energy and Resources | <ul style="list-style-type: none"> · Develop green-growth · Develop resources in domestic and foreign countries · Make constant energy supply · Manage nuclear structure | <ul style="list-style-type: none"> · Safely manage the energy · Support administration of managing radioactive waste · Support the demand and supply of electricity |
| Industrial Complex | <ul style="list-style-type: none"> · Support the entrance road of industrial complex | <ul style="list-style-type: none"> · Support the local industrial base |

Source: National Assembly Budget Office, "The Mid-Term Requirement in Industry and Energy," Seoul: National Assembly of ROK, last modified October 31, 2011, http://www.nabo.go.kr/Sub/04Etc/popReport.jsp?funcSUB=view&bid=19&arg_id=3330.

In consideration of the above programs, this chapter divided industrial programs into three categories: industry promotion, trade promotion, and development of energy and resources. Industrial promotion consists of restructuring, establishing industrial complex and management, and subsidizing industrial development.

2. The Money that SK Can Pay in Manufacturing

As previously stated, a unified Korea will be able to endure 5% of SK's GDP as a total unification cost every year. In 2015, the proportion of the industrial budget in its government budget is about 5%. If a unified government adapts the budget system of SK, it will spend 0.25% of SK's GDP in the industry of NK. To calculate the exact money that SK can pay, the long-term finance prospect of the National Assembly Budget Office in SK is helpful (see Table 12).

Table 12. Long-Term Finance Prospect of SK from 2031–2050

| Classification Year | Nominal GDP (in billion \$) | Real GDP (in billion \$) | Exchange (KRW/\$) |
|------------------------|--------------------------------|-----------------------------|----------------------|
| 2031 | 4,680.3 | 2,586.0 | 770.2 |
| 2032 | 4,938.8 | 2,675.3 | 760.9 |
| 2033 | 5,210.0 | 2,767.9 | 751.8 |
| 2034 | 5,488.7 | 2,861.3 | 742.8 |
| 2035 | 5,716.1 | 2,925.4 | 742.4 |
| 2036 | 5,947.0 | 2,989.2 | 742.0 |
| 2037 | 6,180.4 | 3,052.6 | 741.7 |
| 2038 | 6,418.2 | 3,116.3 | 741.3 |
| 2039 | 6,659.3 | 3,180.1 | 740.9 |
| 2040 | 6,907.9 | 3,245.9 | 740.6 |
| 2041 | 7,160.6 | 3,312.2 | 740.2 |
| 2042 | 7,412.7 | 3,376.9 | 739.8 |
| 2043 | 7,659.5 | 3,438.1 | 739.5 |
| 2044 | 7,909.9 | 3,500.1 | 739.1 |
| 2045 | 8,160.8 | 3,561.4 | 738.7 |
| 2046 | 8,411.6 | 3,622.0 | 738.3 |
| 2047 | 8,660.2 | 3,681.0 | 738.0 |
| 2048 | 8,907.8 | 3,739.4 | 737.6 |
| 2049 | 9,153.1 | 3,796.7 | 737.2 |
| 2050 | 9,393.9 | 3,851.7 | 736.9 |

Source: National Assembly Budget Office, "The Long-Term Finance Prospect Analysis," Seoul: National Assembly of ROK, last modified June 25, 2012, http://www.nabo.go.kr/Sub/04Etc/popReport.jsp?funcSUB=view&bid=19&arg_id=3674.

A unified Korea can pay \$352.5 billion in nominal costs in the industrial sector for 20 years, which also means \$163.3 billion in real cost.

3. Expected Unification Cost in Manufacturing

a. Restructuring State-Owned Enterprises in NK

There are 554 state-owned enterprises in NK.⁵⁵ According to Korea Asset Management Corporation (KAMCO), there are only about 50 enterprises that makes profits or are competitive. Only about 10% of all state-owned enterprises are working now. In the case of Germany, 3,600 of a total 13,000 enterprises were liquidated; the others were privatized. The German government supported the cost of discarding facilities and cleaning up the environment in the liquidation process; it also financially supported the privatization process. In the process, Germany spent about 200 billion deutsche mark (DM).⁵⁶ Considering the exchange rate in 1989 (\$1 = 1.62DM),⁵⁷ it would be equal to \$123 billion in 1989 dollars. If NK's 50 enterprises are privatized, a unified Korea's government would spend about \$77 million in 1989 dollars. In other words, about \$150 million would be needed in today's dollars.⁵⁸

b. Construction and Management of an Industrial Complex

After unification, a unified Korea should establish an industrial complex in the area of the Yellow Sea, which provides an ideal location for promoting trade and establishing factories. The survey from the Korea Research Institute for Human Settlements indicates that Nampo, Sinuiju, and Haeju are favorable cities for businessmen to establish industrial complexes.⁵⁹ These cities can provide accessibility to

⁵⁵Yi-seop Choi, "NK State-Owned Enterprises Estimates about 554," Financial Supervisory Service, last modified February 28, 2015, http://www.fss.or.kr/fss/kr/promo/flash/flash_view.jsp?seqno=43457&no=1309&page=76&s_kind=&s_title=.

⁵⁶Thomas Lange and Geoffrey Pugh, *The Economics of German Unification* (Cheltenham, UK: Edward Elgar, 1998), 63–91.

⁵⁷See <http://www.history.ucsb.edu/faculty/marcuse/projects/currency.htm>.

⁵⁸See <http://www.in2013dollars.com/1989-dollars-in-2014?amount=77000000/>

⁵⁹National Assembly Budget Office, "Economic Effect of Korean Unification" (Seoul: Ministry of Unification, last modified December 22, 2014), <http://www.unikorea.go.kr/content.do?cmsid=3096&mode=view&page=&cid=42368>, 124.

the world market, and the large populations in these cities can also provide cheap labor. Thus, light industry and manufacturing can be developed in these areas.

Kaesong Industrial Complex (KIC), which was established with SK money on the border of NK in 2004, is a good example to use to estimate the cost of constructing industrial complexes in NK. SK's government does not provide the exact costs, but KRIHS estimated the cost to be \$863 million as of April 2013 through data from the Ministry of Unification in Korea and a press release.⁶⁰ Specifically, the government invested \$506 million in facilities and equipment; it also spent \$357 million in infrastructure. Based on the example of KIC, KRIHS estimated that it cost SK roughly \$2.7 billion to establish industrial complexes in Nampo, Sinuiju, and Haeju.⁶¹

In the case of KIC, the SK government has spent about \$120 million every year.⁶² From this example, a unified Korea would spend about \$400 million every year.

c. Subsidies of Industrial Development

The SK government has spent about \$11 billion yearly to promote industry. In consideration of NK's economic scale and its GDP, it is better for a united Korea to increase its subsidies every year. Taking into account 1/60 of SK's GDP, a unified government needs to invest \$0.5 billion after unification and increase \$0.5 billion every year. To match SK's current economic indicators after two decades, a total \$103 billion would be needed.

⁶⁰Nakgu Yang, "The Closure of the Kaesong Industrial Complex," *Asian Economy*, April 29, 2013, <http://www.asiae.co.kr/news/view.htm?idxno=2013042709333197493>.

⁶¹National Assembly Budget Office, "Economic Effect of Korea Unification," 124.

⁶²ROK Ministry of Unification, "Inter-Korean Cooperation Fund" (Seoul: Ministry of Unification, accessed August 23, 2015), <http://www.unikorea.go.kr/content.do?cmsid=3100>.

d. Subsidies of Trade and Investment

The SK government has spent \$526.2 million to promote trade and investment. When calculated in the same way as subsidies of industrial development, a unified government would need to invest \$25 million in 2031 and increase \$25 million every year. Thus, \$5.25 billion would be needed.

e. Development and Management in Energy and Resources

NK has about 20 profitable minerals, including gold, silver, magnesite, and iron. The amount of gold in NK is estimated to be up to 698 tons; iron ore is up to 24.7 tons; magnesite is up to 3.3 billion tons (see Table 13). According to the data of the NK Resource Research Center, the value of underground resources is estimated at \$5.8 billion in 2013. The value of resources is 24 times that of SK.⁶³ Therefore, if the cheap labor and natural resources of NK are combined with the capital of SK, a unified Korea could have a highly profitable industry and reduce the rate of importing resources.

KRIHS estimated \$272 million to develop NK's underground resources.⁶⁴ It was estimated by applying the example of China and SK on the scale of production.

⁶³National Assembly Budget Office, "Economic Effect of Korea Unification," 125.

⁶⁴Ibid., 127.

Table 13. NK's Deposits and Value of Mineral Resources

| Sort | Type | Criteria | Deposit | Value (in million \$) |
|---------------|----------------|-----------------------------------|-------------------------|--------------------------|
| Jewelry | Gold | Metal | 698 tons | 33,135 |
| | Silver | Metal | 6,356 tons | 5,160 |
| | Total | | | 38,294 |
| Primary Metal | Iron ore | Fe 63.5% | 2,467,517 thousand tons | 337,581 |
| | Copper | Metal | 4,235 thousand tons | 31,418 |
| | Zinc | Metal | 27,425 thousand tons | 52,574 |
| | Lead | Metal | 9,988 thousand tons | 21,528 |
| | Total | | | 443,101 |
| Rare Metal | Molybdate | Oxide | 18,745 tons | 448 |
| | Wolframite | W _o ₃ 65% | 146,016 tons | 61 |
| | Nickel | Metal | 147,638 tons | 2,313 |
| | Manganese | Metal | 2,989 tons | 7 |
| | Total | | | 2,829 |
| Non Metal | Magnesite | MgO95% | 3,316,937 thousand tons | 1,455,538 |
| | Apatite | P ₂ O ₅ 30% | 250,738 thousand tons | 54,345 |
| | Fluorite | Each Level | 15,397 thousand tons | 4,956 |
| | Barite | Each Level | 15,397 thousand tons | 3,733 |
| | Flaky Graphite | FC 95% | 14,596 tons | 25,489 |
| | Total | | | 1,544,061 |
| Energy | Lignite | Each Level | 17,947,540 | 3,033,134 |
| | Anthracite | Each Level | 4,076,390 | 688,910 |
| | Total | | | 3,722,044 |
| Total | | | | 5,750,329 |

Source: National Assembly Budget Office, "Economic Effect of Korean Unification" (Seoul: Ministry of Unification, last modified December 22, 2014), <http://www.unikorea.go.kr/content.do?cmsid=3096&mode=view&page=&cid=42368>, 127.

Today, the SK government is focusing on green-growth, energy resource development, and building an energy supply system in energy sectors. In consideration of 1/60 of SK's manufacturing GDP, a unified government would invest \$200 million and

annually increase \$200 million for 20 years to match SK's current economy. Thus, \$42 billion would be needed.

f. Total Estimated Unification Cost in Manufacturing

Considering the collapse of North Korean industry, the aforementioned programs would not only provide its industrial foundation, but also lead to the sustainable development of a unified Korea. The government would need \$161.372 billion, based on the value of the currency in 2014. In consideration of SK's expected inflation rate (see Table 14), this figure rises to \$235.445 billion. Consequently, a unified government cannot pay the total estimated industrial costs. About \$72 billion would be needed.

Table 14. SK's Expected Inflation Rates from 2015–2030

| | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| % | 2.66 | 2.5 | 2.7 | 2.7 | 2.6 | 2.6 | 2.5 | 2.5 | 2.4 | 2.4 | 2.3 | 2.2 | 2.1 | 2.09 | 2.03 | 1.97 |

Source: National Assembly Budget Office, "The Long-Term Finance Prospect Analysis," Seoul: National Assembly of ROK, last modified June 25, 2012, http://www.nabo.go.kr/Sub/04Etc/popReport.jsp?funcSUB=view&bid=19&arg_id=3674.

4. Specific Distribution Suggestion

Although industrial unification costs would exceed 0.25% of SK's GDP, diverse cooperation, preparing for the unification, and MNCs' investments would be able to reduce its cost. For cost-effective implementation, this chapter presents a specific distribution of manufacturing (see Table 15 and Table 16).

Table 15. Distribution of Industrial Unification Cost from 2031–2050

| Classification \ Year | 2031–2035 | 2036–2040 | 2041–2050 |
|----------------------------------|-----------|-----------|-----------|
| Industry Promotion | | | |
| 1. Restructuring | 0.12 | 0.03 | - |
| 2. Support Industrial Complex | 4.7 | 2 | 4 |
| 3. Develop and Maintain Industry | 7.5 | 20 | 75.5 |
| Trade Promotion | 0.375 | 1 | 3.875 |
| Develop Energy and Resources | 3.272 | 8 | 31 |
| Total | 15.967 | 31.03 | 114.375 |

Costs shown are the value of currency in 2014. Numbers are in billion \$.

Table 16. Distribution of Industrial Unification Cost from 2031–2050

| Classification \ Year | 2031–2035 | 2036–2040 | 2041–2050 |
|----------------------------------|-----------|-----------|-----------|
| Industry Promotion | | | |
| 1. Restructuring | 0.175 | 0.044 | |
| 2. Support Industrial Complex | 6.86 | 2.918 | 5.836 |
| 3. Develop and Maintain Industry | 10.9425 | 29.18 | 110.1545 |
| Trade Promotion | 0.5471 | 1.459 | 5.654 |
| Develop Energy and Resources | 4.7738 | 11.672 | 45.229 |
| Total | 23.2984 | 45.273 | 166.8735 |
| The money which SK can pay | 34.5 | 39.1 | 89.7 |
| Shortage amount | +11.2016 | -6.173 | -77.1735 |

Costs shown are the value of currency in 2030. Numbers are in billion \$.

The lesson of German unification presents that “in the five years following German unification, its government poured \$600 billion of public money into developing the East. That figure exceeds five percent of German GDP for that same period.”⁶⁵ In consideration of Germany’s costs, a unified government may also spend a lot of money beyond what SK can afford to.

In the early stages of unification, a unified Korea would focus on restructuring and reestablishing NK’s industry. If the government efficiently spends its expenditure, it would reduce its future economic shortage. From 2041 to 2050, about \$77 billion more

⁶⁵Jonathan L. Schmitz, “The Economic Implications of Korean Unification,” (master’s thesis, Naval Postgraduate School, 2002), 48, <http://hdl.handle.net/10945/5844>.

would be needed (see Table 16). If there are investments in the private sectors or help from the international community, however, Koreans would overcome their economic burdens and be able to benefit from unification. Consequently, the government should reduce the risk of investment by investigating NK's environment and providing a detailed economic master plan in the early stages of unification. These efforts can reduce its future economic shortage; eventually, these can be connected with various investments and lead to its economic success.

5. Government's Work in Manufacturing

This chapter explores what the governments of the two Koreas needs to reduce the cost in manufacturing. According to aforementioned programs and classifications (see Table 15 and Table 16), this chapter deals with restructuring, industrial complexes, industrial subsidies, trade, and energy.

a. Restructuring

After unification, restructuring will be a burning issue. Germany dealt with restructuring through the creation of the Treuhandanstalt.⁶⁶ This institution sorted nationalized companies of East Germany. If a company could not survive in a market economy, it was closed. Many companies were removed, and surviving companies became privatized. Then the institution received a lot of subsidies since it wanted to raise employment and maintain productivity. North Korea, however, does not have valuable companies like East Germany, since it has focused on producing war materials and weapons. A unified Korea should spend the money removing war materials and get rid of most companies in North Korea. In contrast to East Germany, industrial restructuring can have more benefits than giving subsidies. Because of this action, many people may lose their jobs. Most companies, however, do not work today, so workers may have other jobs. Therefore, this action would have less of an effect on them. Through restructuring, a unified Korea would achieve a foundation of industry and a labor market. In the long-term, the action will be beneficial for the economy to raise industrial competitiveness as

⁶⁶ Cho et al., *A Research on the Costs and Benefits of Korean Unification*, 265.

well as remove incompetent nationalized companies. Moreover, restructuring can also improve economic cooperation between the two Koreas. South Korea has competent workers, but does not have many resources, while North Korea has unskilled workers and various natural resources.

b. Support Industrial Complexes

Kaesong Industrial Complex is a significant example of establishing an industrial complex. This complex represents the reconciliation of South and North, and makes a lot of profit using cheap workers on the border. To build an industrial complex, a unified government would spend SOC. The private sector would also spend in this area, but it would be limited without government support. Consequently, the government would build an industrial complex, maximizing its profit and minimizing its danger of investment. A city which has a large population and is adjacent to China would be a good choice. If an industrial complex is built, a unified Korea will achieve rapid industrialization. In the 1970s and 1980s, SK also achieved its economic success using this policy. The industrial complex will have a ripple effect on the whole community. The success of industry gives society a great deal of money. It can also improve the quality of life in NK. To reduce costs, the two Koreas should cooperate before the unification. NK should introduce a market system in its economy and adopt a gradual open-door policy, such as the Chinese model. SK needs to support money, technology, and international support. If NK shows trust and authenticity to the South, Korean unification will be realized soon.

c. Develop and Maintain Industry

To promote industry, the government should support business in various ways, including through money, technology, and research. A unified government should follow the economic model of Japan and German. These countries have developed on the basis of small industrial businesses that have outstanding technical skills. On the other hand, *chaebol* leads SK's economy. A *chaebol*⁶⁷ is a front-running man among the market of

⁶⁷The *chaebol* are the family-controlled conglomerate of South Korea characterized by connecting with SK's government.

finished goods. To promote industry, a unified Korea should develop small industrial businesses that have excellent technology.

Today, there are black markets as well as many traditional markets in NK. The government should attract traders to establish normal markets. In the 1960s, South Korea had the same situation. Traditional merchants mostly have little money. Consequently, the government should improve productivity and efficiency through the modernization of markets; it could encourage business start-ups by giving subsidies and removing diverse regulations. In this process, the government can lead the development of small industrial business with excellent technology.

d. Trade Promotion

In early unification, attracting trade and investment will be an important factor to overcome economic shortage. A unified Korea will set a high value on trade. In the 2030s, China will not be a factory to the world anymore. A unified Korea would be competitive based on cheap labor and technology to the world market. After unification, UN sanctions are automatically removed, and NK can trade with various countries. Based on the experience of SK, the government should establish effective trade relationships with developed countries. With geographical advantages, China will be the biggest trading partner. To achieve rapid industrialization, foreign capital is also a necessary factor in NK. Many economic reports already anticipate that a unified Korea will be the best investment area. Specifically, China will invest in North Korea. To maintain the investment, the government should deregulate, exempt taxation, support additional money, and support investment advice for foreigners. In addition, the SK government should be responsible for whole economic activity in NK to attract FDI in the early unification. Free economic zones can be a way to attract foreign capital. Thus, SK should be familiar with the investment inclinations, systems, and environments of developed countries as well as China.

e. Develop Energy and Resources

Energy is a necessary element to build strong industry. According to recent research, NK's power plant needs renovation rather than destruction since building power

plants require too much money.⁶⁸ Most equipment in power plants will have to be replaced. A thermoelectric power plant can be a good option since it can easily be built and produce energy. A unified Korea will also build hydroelectric power generation, but the installation cost is too high, and it can destroy the environment. In consideration of the 2011 Fukushima nuclear accident, Korea should pay close attention to building nuclear power plants. Thus, the government should focus on alternative energy for its sustainable development after setting up a thermoelectric power plant. In addition to power plants, the government has to invest in smart grid, which will take a lot of money. The money, however, would be returned to the investor, so the government encourages people to invest in smart grid. With an increase in the use of electricity and the development of a smart grid, environmental destruction would also be reduced since NK does not use coal and trees anymore. As a result, the quality of life would be increased.

Although NK has developed its resources for a long time, profitability is not good since NK lacks skilled workers. Like industry restructuring, most NK resource companies should also be removed. A few companies that have profitability would be left. In the process, the government should receive the information about resources from the state-owned enterprises. It is better for a unified government to research the natural resources of NK before the unification. If that is not possible, geological research using satellites will be helpful for SK's government to reduce its cost.

⁶⁸Kyung-sul Kim, *South Korea and North Korea Energy Cooperation Ways Research* (Ulsan, ROK: Korea Energy Economics Institute, 2012), 13,
https://www.nkis.re.kr:4445/researchReport_view.do?otpId=B41001800022429.

G. FOOD INDUSTRY

The continuous food crisis in NK would require a reform of the agriculture sector. If this agricultural reform is successful, the food crisis will be solved, since the proportion of agricultural production within total production is high. Thus, a unified Korea should support NK's agricultural reform to increase its competitiveness. Moreover, after its reform is complete, the government needs to continuously support NK's agriculture since food is a foundation of the state's industry, and productivity and profitability are low compared to other industries. In fact, the SK government spends more money in the food sector than in industry.

From a GDP perspective, NK's agriculture is about 1/4 of SK's agriculture.⁶⁹ Its cultivated area, however, is similar to that of SK. Therefore, a unified government should focus on increasing its output from the early stage of unification.

1. Analysis of SK's Food Budget

SK has budgeted \$17.5 billion in 2015 (see Table 17). Both SK and NK spend a large part of their budgets on the agriculture sector. Although the proportion of the self-sufficiency in rice is high in SK, the others are very low. Due to many federal trade agreements (FTAs), SK's agriculture is facing a crisis. The government is trying to increase the quality of agricultural products, so it aims to be competitive in the world's agriculture market. To raise its competitiveness and strengthen food security, the SK government supports its agriculture in many ways (see Table 18).

⁶⁹Bank of Korea, "Economic Statistics System."

Table 17. SK's Food Budget in 2015

| Classification | Money (in billion \$) | Weight (percentage of budget) |
|----------------|-----------------------|----------------------------------|
| Agriculture | 13.2 | 75.4 |
| Forestry | 1.8 | 10.3 |
| Fisheries | 1.8 | 10.3 |
| Food industry | 0.7 | 4.0 |
| Total | 17.5 | 100.0 |

Source: ROK Ministry of Strategy and Finance, "Summary of Budget for FY2015," Seoul: ROK, last modified January 30, 2015, <http://www.korea.kr/archive/expDocView.do?docId=35932>.

Table 18. SK's Food Programs

| Classification | Programs |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Agriculture | <ul style="list-style-type: none"> • Agricultural production based construction • Farm management support • Grain management • Rural economy development and invigoration in urban and rural interexchange • Agriculture price stability and effectiveness of distribution |
| Forestry | <ul style="list-style-type: none"> • Climate change response plan and fostering forest resources • Protecting forest resources • Using forest resources |
| Fisheries | <ul style="list-style-type: none"> • Fisheries distribution effectiveness • Fisheries business promotion • Fishery resources management • Fishing village development |
| Food industry | <ul style="list-style-type: none"> • Food industry development |

Source: National Assembly Budget Office, "The Mid-Term Requirement in Agriculture and Fishery," National Assembly of ROK, last modified August 27, 2012, http://www.nabo.go.kr/Sub/04Etc/popReport.jsp?funcSUB=view&bid=19&arg_id=3792.

Like China's agricultural reform, NK's collective farms would be removed. The government would support small peasant farmers to make a profit. In the 1970s, President Park Jung-hee started the *Saemaul* Movement. To escape from poverty, the president gathered the people's wisdom and effort into developing their villages through competition. Community leaders thought and acted sincerely at first; people worked with those leaders and were dedicated to develop their communities. SK's government

encouraged communities to compete, and their excellent outcomes were spread to the whole country. As a result, rural communities were developed within a short time, and the gap between urban and rural was reduced significantly. A unified government would carry out this movement; it would rapidly develop the rural economy.

In the forestry sector, SK focuses on forestry policy to promote the development and protection of both. Since NK's mountains are devastated severely due to the shortage of food,⁷⁰ however, a unified Korea needs to focus on reforestation programs. Furthermore, the proportion of forest in the land is greater than that of SK, so a unified government needs to spend more money on reforestation than it does in SK.

In developing the fishery sector, the government programs are similar to the agricultural programs. After the unification, these programs would be also applied in NK. According to the successful development of its fishery, the programs would be able to adjust.

Food industry is one of industry sectors that can be established with little money. Small private businesses founded by North Koreans may flourish if its economy is successful. Also, the food industry needs management and supervision by the government due to safety concerns. Thus, a unified government would encourage North Koreans to establish their business and also supervise the hygiene and safety of products.

2. The Money that SK Can Pay in the Food Industry

The current weight of the food sector in SK would account for 0.25% of SK's GDP. In other words, a unified Korea would spend 5% of its total unification cost on the food sector. Based on the long-term financial prospect from the National Assembly Budget Office in SK, a unified Korea can pay \$352.5 billion in nominal costs in the industrial sector for 20 years, which means \$163.3 billion in real cost.

⁷⁰Because of food crisis, North Koreans ate grasses and weeds to make into soup. Peter Foster, "North Korea Faces Famine: 'Tell the World We Are Starving,'" *Telegraph*, July 16, 2011, <http://www.telegraph.co.uk/news/worldnews/asia/northkorea/8641946/North-Korea-faces-famine-Tell-the-world-we-are-starving.html>.

3. Expected Unification Cost in the Food Industry

a. Agricultural Reforms

NK's system based on collective farms should be dismantled, and the family farm system, like in SK, would be established. To settle down well, the government needs to support NK farmers; for example, by spreading valuable breeds and advanced technology, and constructing the farming model complex. KIEP and KIET calculated its reform cost in 2010: \$150 million.⁷¹ The institution assumes the reform is over within three years. Like in the example of China, the government of a unified Korea can increase its agricultural competitiveness through giving incentives, so it would be able to reform its agricultural structure.

b. Agricultural Initial Development

Because of poor agricultural infrastructure and its defenseless current situation against natural disasters, NK's agricultural production is always low. Although the authority tries to raise its output, its food crisis has continued every year. To normalize its agriculture, a unified government should carry out comprehensive agricultural development. For example, they could extend irrigation facilities, reinforce work in old facilities, and readjust land.

The National Assembly Budget Office calculated NK's agricultural initial development based on Yeongsan River farmlands in the southwest of ROK. SK invested in the area of Yeongsan River to change it to the farmland in 1999. At that time, the project cost was about \$36,000 per hectare in the preliminary feasibility study of the project. When calculating the present value in SK, it is roughly \$72,000 per hectare.⁷² Since the labor costs of NK are different from those of SK, however, it needs to recalculate the cost. In 2014, the average labor cost of Kaesong Industrial Complex was about \$130 per month. It is about one sixth of SK's average labor cost. Therefore, in consideration of the total agricultural land—1,614,000 ha—the development cost is about \$74.8 million, as of 2014 (see Table 19).

⁷¹KIEP and KIET, *Korea Economic Community Promotion Initiative*, 269.

⁷²National Assembly Budget Office, "Economic Effect of Korean Unification," 119.

Table 19. NK's Agricultural Initial Development Cost

| Classification | Amount (in thousand \$) | Classification | Amount (in thousand \$) |
|-----------------------------|----------------------------|------------------------------------------|----------------------------|
| Purity construction expense | 64,356 | Measurement and design expense | 3,604 |
| 1. Water supply | 5,504 | 1. Data survey | 1,352 |
| 2. Irrigation canal | 27,545 | 2. Enforcement design | 2,253 |
| 3. Land planning | 3,906 | Taskmaster expense | 5,406 |
| 4. Drainage improvement | 6,803 | Business management expense | 966 |
| 5. Unused area development | 10,249 | Other expense | 142 |
| 6. Conversion to rice paddy | 2,889 | Environmental effects evaluation expense | 393 |
| 7. Farm improvement | 6,032 | Total | 74,870 |
| 8. Automatic management | 1,427 | | |

Source: National Assembly Budget Office, “Economic Effect of Korean Unification” (Seoul: Ministry of Unification, last modified December 22, 2014), <http://www.unikorea.go.kr/content.do?cmsid=3096&mode=view&page=&cid=42368,118>.

c. Subsidies of Agricultural Sustainable Development

KIEP presented a food unification cost in 2010. It calculated the cost that NK needs to develop sustainable growth, including expanding farmland and supporting stable agricultural water. It is estimated that SK needs \$12 billion for 10 years from 2030.⁷³ Moreover, since NK farmland's area is similar to that of SK—NK has 1,614,000 ha, and SK had 1,711,000 ha in 2013—agricultural subsidies would be similar to that of SK 10 years after unification. Thus, this chapter estimates that a unified government would spend \$13 billion every year on agricultural development.

d. Forestry

Based on examples of forest restoration projects of Gangwon Province in SK, the thesis can estimate its restoration cost. Considering NK's forest area—5,412,800 ha in 2012—KIEP estimates a unified government needs up to \$2 billion from \$707 million for four years.⁷⁴ The forest area in NK, however, is decreasing every year due to food crisis.

⁷³KIEP and KIET, *Korea Economic Community Promotion Initiative*, 541.

⁷⁴Ibid., 269.

Moreover, SK's government does not know the exact forest condition; the accuracy of this estimate is low. Thus, this thesis can obtain an approximate unification cost through the maximum figure of KIEP's research.

Although SK's forest area—7,300,000 ha—is larger than NK's forest area today, NK's forest area was up to 8,201,000 ha in 1990 before its food crisis. Therefore, this thesis expects that a unified government would spend \$2 billion every year on forestry.

e. Fishery

The fishery sector also needs a similar reform, like its agriculture. To prevent illegal fishing of China in the Yellow Sea, the cooperation of two Koreas is essential. Based on the precise survey, the government of a unified Korea should establish a fishery development plan. In this regard, KIEP argues that the government supports making fish farms in NK's area. Because of cold weather and high latitude, there are diverse cold sea fish in the sea of NK. KIEP estimates the cost to make fish farms \$20 million.⁷⁵

To calculate fishery subsidies, the size of NK's fishery ground is necessary. Due to a shortage of data, however, this thesis uses the maximum catches recorded by NK in consideration of NK's fishery recover. Recently, NK's fishery is not active because of a lack of oil. In 1985, it harvested 1,781,000 tons of fish. This figure is 56% of SK's fish catch in 2014. Thus, a unified government would spend \$1 billion every year on the fishery sector.

f. Food Industry

The support of the food industry easily influences the increase of the quality of life. Since North Korean people can start a food business with little money, the government's support can help them adapt to the market economy. KIEP estimates \$10 million as the cost to establish food distribution centers.⁷⁶ In addition, based on NK's population, a unified government may need to spend \$350 million every year on the food industry.

⁷⁵Ibid.

⁷⁶Ibid.

g. Total Estimated Unification Cost in the Food Industry

The above programs would lay the foundation for raising the quality of life as well as increasing food products in NK. A unified government would need \$333.2548 billion based on the value of the currency in 2014. In consideration of expected inflation rates, this figure increases up to \$486.3 billion. Thus, \$323 billion more would be needed. The food sector is not easy to attract FDI because of trade barriers and government subsidies. To reduce its figure, the two Koreas need to cooperate to develop NK's food products before the unification. In addition, SK needs to reform its financial in food as well as agricultural sector. To make competitive products, the government needs to improve plant breeding and reform the distribution structure, rather than increasing subsidies. Thus, a unified government should encourage its farmhouses to compete in the global market in the early stage of unification, rather than giving subsidies.

4. Specific Distribution Suggestion

To effectively spend government funds, this chapter suggests specific distribution based on estimated food unification cost.

Table 20. Distribution of Food Unification Cost from 2031–2050

| Classification | Year | 2031–2035 | 2036–2040 | 2041–2050 |
|------------------------------|---------|-----------|-----------|-----------|
| Agriculture | | | | |
| 1. Reforming | 0.15 | - | - | |
| 2. Initial development | 0.0748 | - | - | |
| 3. Subsidies for development | 65 | 65 | 130 | |
| Forestry | 12 | 10 | 20 | |
| Fishery | 5.02 | 5 | 10 | |
| Food industry | 1.66 | 1.65 | 3.5 | |
| Total | 83.9048 | 81.65 | 163.5 | |

Costs shown are the value of currency in 2014. Numbers are in billion \$.

Table 21. Distribution Food Unification Cost from 2031–2050

| Classification \ Year | 2031–2035 | 2036–2040 | 2041–2050 |
|------------------------------|-----------|-----------|-----------|
| Agriculture | | | |
| 1. Reforming | 0.2189 | - | - |
| 2. Initial development | 0.1091 | - | - |
| 3. Subsidies for development | 94.835 | 94.835 | 189.67 |
| Forestry | 17.508 | 14.59 | 29.18 |
| Fishery | 7.3242 | 7.295 | 14.59 |
| Food industry | 2.4219 | 2.4074 | 5.1065 |
| Total | 122.4171 | 119.1274 | 238.5465 |
| The money which SK can pay | 34.5 | 39.1 | 89.7 |
| Shortage amount | -87.9171 | -80.0274 | -148.8465 |

Costs shown are the value of currency in 2030. Numbers are in billion \$.

In the early stages of the unification, the reform of NK's agriculture is needed. Because of NK's cool weather, commercial as well as high-income crops are needed. With the help of farm service agency, the government should focus on agricultural reform. As time goes on, the necessity of reform would be reduced. On the other hand, building production and distribution systems are essential to improve agriculture productivity and increase agricultural production. Based on agricultural system reform, these goals and efficiency can be achieved by continuing to increase the investment. Due to the devastation of NK's forest, the forestry sector needs to increase its expenditure compared with SK's forestry budget. The proportions of fishery and food industry would decrease compared with that of SK's budget because of the relatively small fish catch and population.

5. Government's Work in the Food Industry

Because of the expected high costs of food production during unification, a unified government cannot pay the cost if it adopts SK's agricultural programs. A unified government as well as two Koreas should make an effort to reduce its costs before the unification.

a. Agricultural Reforms

A unified government needs to raise farmhouses' income and agricultural productivity by spreading advanced agricultural technology and diversifying agricultural products. Today, NK's agricultural policy focuses on growing staple grains, but it would be better to concentrate commercial crops to make more profit after the unification. This is because it is competitive based on cheap labors in China's market as well as SK's market. To achieve NK's structural reform, this chapter suggests some policies. First, the government needs to dispatch SK's prominent agricultural experts to the North. In SK, rural development administration (RDA) has a role of extensive agricultural research, services, and spreading its technology. Second, the government should support farmers by providing agricultural machinery in the early stages of unification. Since North Korea has little money, the machinery is necessary for the people to raise productivity. Moreover, the government can induce NK's farms to be competitive while reducing its subsidies in the long term. Third, the government has to provide the environment in which the rural farms can cheaply and easily borrow money. Through strong financial cooperation federations, farmers can make a profit and steadily develop their farming while they learn market economy. The aforementioned suggestions may be better if they use the automated of agricultural machinery. In other words, the automation will lead to the idle rural workers to the cities. As a result, the government can supply enough labor forces for the cities' industries.

b. Agricultural Development

Initial development and subsidies are important to raise NK's agricultural level. Although the regime invested in its agricultural improvement, it is inferior when compared with SK. First, a unified government needs to prepare a water management plan. Due to global warming, the frequency of drought is increasing while frequent flooding occurs in the summer. In addition, its precipitation is low compared with SK. Thus, water management is essential in the initial development. Second, its land readjustment is also needed to improve efficiency. With the dissolution of collective farms, the government should redesign its farmland to fit agricultural mechanization.

Today, NK has managed its farmland to maximize its output without any plans. Third, the government should invest in soil improvement. Using improper fertilizer exacerbated its soil quality. Moreover, poor North Koreans have been eating grasses and weeds for food;⁷⁷ as a result, the quality of the soil has deteriorated.

The SK government needs to change its agricultural strategy to strengthen competition if a unified government follows SK's agricultural budget. Its subsidies, which respond to foreign agricultural products due to its FTA, can rather hinder their development. Bread improvement, diversification, and global warming research would increase their future income.

Since the agricultural sector is a difficult sector to enter FDI due to the need to protect domestic farmhouses, the effort of a unified government is needed. While following advanced farming technology and management, the government should lead the competitiveness of agriculture in the world market, rather than giving subsidies.

c. Forestry

The use of long-term wood fuel and logging without any plans has likely exacerbated the forestry problem in NK. The authority, however, could not pay attention to its forestry because of the continuous economic crisis, despite frequent flooding. If a unified government manages its forestry resources well, it will influence rural economic activities as well as develop forestry resources and the tourist industry.

In the early unification period, the government needs to modify the ownership over NK's forests. Deploying SK's forest experts, the government should focus on erosion control on NK's mountain and promote an extensive reforestation programs. In this regard, the SK government needs technical and seedling support for NK to promote a reforestation program from humanitarian assistance before the unification. Moreover, it should research and analyze the makeup of the soil through its satellites and humanitarian assistance.

⁷⁷Foster, "North Korea Faces Famine."

d. Fishery

The fishery sector also requires a level of similar change with the agricultural sector. A unified government should provide financial support for fishermen as well as technical support in the early unification period, such as national federation of fisheries cooperatives. To increase the efficiency of its distribution, the government needs to set up diverse distribution and storage facilities by attracting investment. In addition, since marine products are related to safety issues, the government should strictly supervise and administer its distribution system.

e. Food Industry

A unified government should support the food industry sector to increase North Korean incomes and adapt the market economy. It will also be necessary to provide proper supervision and an inspection system for convenience food, as well as tax and funding benefits.

H. INFRASTRUCTURE

Focusing on NK's infrastructure is one of the urgent tasks to achieve rapid development. Since its infrastructure is underdeveloped, its development will be a foundation for recovering the economy, as well as a key driver of economic resolution. It is also essential for the achievement of practical economic integration. Kaesong Industrial Complex and initial SK's development are good examples to estimate the cost of developing NK's infrastructure.

1. Analysis of SK's Infrastructure Cost

Today, the expenditure of SK's government is largely divided into two parts: transportation and logistics, and land and regional development. The transportation and logistics sectors include road, rail, urban rail, shipping, air, and logistics. The land and regional development sectors include water resources and urban sectors. As shown in Table 22, SK's current expenditures are focused on the transportation and logistics sectors, rather than the development sectors. Among the transportation and logistics sectors, both road and rail sectors account for a large proportion.

Table 22. SK's Infrastructure Budget in 2015

| | Amount (in billion \$) | Weight (percentage of budget) |
|-------------------------------|---------------------------|----------------------------------|
| Transportation and logistics | 18.4 | 84.8 |
| Road | 8.3 | 38.2 |
| Rail | 6.1 | 23.1 |
| Urban rail | 0.6 | 2.8 |
| Shipping | 1.5 | 6.9 |
| Air | 0.1 | 0.5 |
| Logistics | 1.8 | 8.3 |
| Land and regional development | 3.3 | 15.2 |
| Water resources | 2.1 | 9.7 |
| Region and urban development | 1.2 | 5.5 |
| Total | 21.7 | 100 |

Source: ROK Ministry of Strategy and Finance, "Summary of Budget for FY2015," Seoul: ROK, last modified January 30, 2015, <http://www.korea.kr/archive/expDocView.do?docId=35932>.

On the other hand, NK's status quo of infrastructure is very bad compared with that of SK. In other words, the government of a unified Korea would spend its budget at different proportions. For example, the urban railway sector is not necessary in the early unification period. After the unified country is somewhat developed, it would be needed. Table 23 presents what SK government provides through its infrastructural programs.

Table 23. SK's Infrastructural Programs

| Sectors | Programs |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Road | <ul style="list-style-type: none"> • Highway design and construction • Road management and construction • The improvement of regional traffic safety • Private road construction and management |
| Railway | <ul style="list-style-type: none"> • KTX(high-speed railroad) construction • Railroad construction • Railway safety and management • Metrorail construction |
| Urban Railway | <ul style="list-style-type: none"> • Subway construction support • Light rail construction support • Urban railway management support |
| Shipping | <ul style="list-style-type: none"> • New harbor construction development • Major harbor maintenance and redevelopment • Port management and marine transportation • Marine expert training and management |
| Air | <ul style="list-style-type: none"> • Air infrastructural development support • Air management support • Airport construction and management |
| Logistics | <ul style="list-style-type: none"> • Logistics policy • Auto and traffic policy • Public transportation development • Traffic administration |
| Water Resources | <ul style="list-style-type: none"> • River management and Flood forecast • Dam construction and improving flood control capability • Water resources policy |
| Regional Development | <ul style="list-style-type: none"> • Regional development • Urban Policy • Land information management |

Source: National Assembly Budget Office, "The Analysis of 2006 National Budget," Seoul: National Assembly of ROK, last modified October 25, 2005, http://www.nabo.go.kr/Sub/04Etc/popReport.jsp?funcSUB=view&bid=19&arg_id=123#.

2. The Money that SK Can Pay in Infrastructure

The current weight of infrastructure sector would account for 0.35% of SK's GDP. Considering the infrastructural ripple effect and R&D's inefficiency, however, this chapter suggests that infrastructure cost accounts for 0.5% of SK's GDP. Based on the long-term finance prospect of the National Assembly Budget Office in SK, a unified

Korea can pay \$705 billion in nominal cost in the infrastructural sector for 20 years, and it also means \$326.6 billion in real cost.

3. Expected Unification Cost in Infrastructure

NK has built its transportation system based on railways, so the rail network is relatively developed. The road network, however, is not developed (see Table 24). Therefore, a unified government should concentrate its balanced transportation system development. Since western NK has a vast flatland and can be a link road to go to China, the government would connect the two countries by roads.

Table 24. The Comparison of the Two Korea's Infrastructure in 2013

| Classification | SK | NK | SK/NK |
|-------------------------------------|-----------|--------|-------|
| Total length of roads | 106,414 | 26,114 | 4.1 |
| Total length of highway | 4,111 | 727 | 5.7 |
| Total length of railway | 3,590 | 5,299 | 0.7 |
| Total length of underground railway | 616 | 34 | 18.1 |
| Cargo Handling capacity at ports | 1,063,669 | 37,000 | 28.7 |
| Number of Airplanes | 623 | 23 | 27.1 |

Road, highway, and railway numbers are in km. Cargo capacity number is in thousand tons. Source: Statistics Korea, Korean Statistical Information Service (database, accessed August 21, 2015), http://kosis.kr/bukhan/statisticsList/statisticsList_01List.jsp?parentId=101_101BUKHANB01.1;101_101BUKHANB01_AA19.2;101_101BUKHANB01_AA19.3#SubCont.

a. Road Construction

After the Korean unification, the Seoul-Kaesong-Pyongyang-China axis will be the central axis of the North's growth. The Pyongyang-Nampo axis also has potential. Currently, these areas account for a large percentage of the goods transported among NK's total traffic. According to the KRIHS's research, a unified government would spend \$14.7 billion for about 4,000 km of new roads and \$5.2 billion to modernize about 3,900 km of existing roads. Overall, about \$20 billion would be needed for road construction (see Table 25).

Table 25. Expected NK's Road Construction Business Expenses

| Stretch of Road | | Kind | Length (in km) | Amount (in million \$) |
|-----------------|----------------------------------|---------|-------------------|---------------------------|
| 1 | Seoul-Kaesong | New | 11 | 175 |
| | Kaesong-Pyongyang | Repair | 162 | 99 |
| 2 | Nampo-Pyongyang | Repair | 45 | 27 |
| 3 | Pyongyang-Wonsan | Expand | 150 | 1,286 |
| | Mt.Geumgang-Wonsan | Expand | 114 | 977 |
| 4 | Hyesan-Samjiyeon | Expand | 80 | 396 |
| 5 | Sinuiju-Ahnju | New | 135 | 2,148 |
| 6 | Sokcho-Kosung | New | 18 | 286 |
| 7 | Kaesong-Haeju | New | 80 | 1,273 |
| 8 | Kaesong-Incheon | New | 40.4 | 805 |
| 9 | Pyongyang-Ahnju | Expand | 120 | 1,029 |
| 10 | Route 1 (Kaesong-Sinuiju) | Repair | 194 | 118 |
| | Route 3 (Pyoungkang-Chosan) | Repair | 556 | 339 |
| | Route 5 (Pyoungkang-Kimhyungjik) | Repair | 542 | 330 |
| | Route 7 (Kosung-Onsung) | Repair | 765 | 466 |
| | Route 31 (Changdo-Kosan) | Repair | 141 | 86 |
| | Route 43 (Geumho-Kosung) | Repair | 119 | 72 |
| 11 | Seoul-Wonsan | New | 100 | 1,590 |
| 12 | Kimpo-Haeju-Jungju | New | 289 | 4,598 |
| 13 | Pyongyang belt way | New | 46 | 732 |
| 14 | Rason-Hunchon | New | 50 | 795 |
| 15 | Chungjin-Ohnsung | New | 142 | 2,226 |
| 16 | Wonsan SEZ roads modernization | Expand | 10 | 50 |
| | Dancheon SEZ roads modernization | Expand | 10 | 50 |
| | Sinpo SEZ roads modernization | Expand | 10 | 50 |
| | Nampo SEZ roads | New | 10 | 69 |
| | Rason SEZ roads | New | 10 | 69 |
| | Sinuiju SEZ roads | New | 10 | 69 |
| | Kaesong SEZ roads | New | 10 | 69 |
| | Haeju SEZ roads | New | 10 | 69 |
| 17 | Hungnam SEZ roads | New | 10 | 69 |
| | Institutional improvement | Upgrade | - | 324 |
| Total amount | | | | 20,774 |

Source: Sangjun Lee et al., "A Study on the 100 Major Inter-Korean Cooperation Issues Focusing on Spatial Development for the Korean Peninsula" (Anyang, Gyeonggi-do: Korea Research Institute for Human Settlements, last modified October 31, 2012), http://library.krihs.re.kr/upload/publication/s_report/0000061622.pdf.

To maintain NK's constructed roads, a unified government would have a similar expenditure compared with that of SK after finishing the expected road construction shown in Table 25. Consequently, this chapter estimates that the government would

spend about \$3 billion every year from 2041 to 2050 since NK's total roads are just 1/3 of SK's roads.

b. Railway Construction

Although the railway is already installed in many locations, connection with various industrial complexes as well as railway modernization are needed. In other words, a transcontinental railroad would be constructed in the long-term. According to the KRIHS, investment costs would estimate about \$17 billion for the installation of 3,300 km of railway (see Table 26).

To maintain NK's total railway, a unified government would expand more than the SK government. In consideration of the new railway as well as the existing railroad, its maintenance cost would be increased up to two times. Thus, a unified government would spend about \$12 billion per year as a maintenance cost in mid-unification.

Table 26. Expected NK's Railway Construction Business Expenses

| Stretch of railway | Kind | Length (in km) | Amount (in million \$) |
|-------------------------------------------------------|---------------|-------------------|---------------------------|
| Kaesong SEZ rail | New | | 45 |
| Rason SEZ rail | New | | 45 |
| Seoul-Wonsan | Modernization | 222.8 | 491 |
| Seoul-Pyongyang-Sinuiju | New | 486 | 7,273 |
| Rajin-Hongui-Namyang | Modernization | 155 | 204 |
| Sinuiju SEZ rail | New | | 45 |
| Dandong, Namyang, and Tumen Station | Modernization | | 135 |
| Kaesong-Pyungsan-Pyongyang | Repair | 186.4 | 255 |
| Rajin-Hunchun | New | | 220 |
| Nampo SEZ rail | New | | 45 |
| Dancheon SEZ rail | New | | 45 |
| Pyongyang-Wonsan-Rason | Modernization | 781 | 2,840 |
| Kangneung-Jejin-Kosung-Wonsan | Modernization | | 2,708 |
| Nampo-Pyongyang | Modernization | 15 | 55 |
| Chongjin Port rail | New | | 45 |
| Haeju Port rail | New | | 45 |
| Shinpo SEZ rail | New | | 45 |
| Kaesong-Haeju | New | 100 | 364 |
| Technical development for a transcontinental railroad | | | 182 |
| Pyongsan-Sepo | Modernization | 141 | 513 |
| Hyesan-Samjiyeon | Modernization | 100 | 309 |
| Hamhung SEZ rail | New | 166.5 | 605 |
| Incheon Rail ferry | New | 367 | 455 |
| Hungnam Port railway | New | | 45 |
| Total amount | | | 17,018 |

Source: Sangjun Lee et al., “A Study on the 100 Major Inter-Korean Cooperation Issues Focusing on Spatial Development for the Korean Peninsula” (Anyang, Gyeonggi-do: Korea Research Institute for Human Settlements, last modified October 31, 2012), http://library.krihs.re.kr/upload/publication/s_report/0000061622.pdf.

c. *Harbor Modernization*

To prepare for increased trade, harbor modernization, expansion, and innovation are required in NK. In addition, since Rajin port will be a central port for three countries' trade—Korea, China, and Russia—and container terminals will be needed. According to the KRIHS, \$1.3 billion is needed to modernize a major port of NK (see Table 27).

In the manufacturing sector, this thesis expects that NK's economy will catch up to the current SK economy approximately 20 years after the unification. Thus, its cargo handling capacity will annually increase by 1.18 times. A unified government would

invest \$75 million in 2031 and increase \$75 million every year because of NK's increased cargo handling capacity. As a result, the government would need to spend about \$15.65 billion for 20 years.

Table 27. Expected NK's Harbor Modernization Business Expenses⁷⁸

| Port | Kind | Amount (in million \$) |
|-----------------------------------------------------|---------------|---------------------------|
| Rajin container pier construction | | 273 |
| Nampo harbor | Modernization | 91 |
| Rajin harbor | Modernization | 244 |
| SK main harbor-Nampo harbor connection | Open | 27 |
| Sinuiju harbor | Modernization | 27 |
| Dancheon harbor | Modernization | 27 |
| Wonsan harbor | Modernization | 182 |
| Haeju harbor | Modernization | 91 |
| Kosung harbor | Modernization | 27 |
| Shinpo harbor | Modernization | 27 |
| Chungjin harbor | Modernization | 136 |
| Hungnam harbor | Modernization | 91 |
| Technical standardization about port infrastructure | | 45 |
| Total amount | | 1,290 |

Source: Sangjun Lee et al., "A Study on the 100 Major Inter-Korean Cooperation Issues Focusing on Spatial Development for the Korean Peninsula" (Anyang, Gyeonggi-do: Korea Research Institute for Human Settlements, last modified October 31, 2012), http://library.krihs.re.kr/upload/publication/s_report/0000061622.pdf.

d. Airport Modernization

Due to the shortage of oil and low demand, private airplanes in NK are extremely rare. Except for the Sunan Airport, which was recently renovated in Pyongyang, the majority of airport facilities are very underdeveloped. Thanks to its economic development, additional airport constructions would be also required. For example, Sinuiju, which is located near the border of NK and China, would be a good location. Considering its underdeveloped airline industry and inefficiency, a unified government would not spend a large amount of money on the airport in the early stages of unification. Based on the example of SK's development, the government would increase its

⁷⁸Ibid.

expenditure on airports when NK's economy began to show growth. Thus, this thesis expects that the government would spend some money for the main airport modernization in the early unification period, but that the majority of its maintenance cost would be consumed in the mid-unification period.

Won-bae Kim in KRIHS estimated a unified government needs about \$130 million to modernize NK's main airport (see Table 28). According to the above assumption, its maintenance cost would be about \$0.55 billion over the 10-years period.

Table 28. Expected NK's Airport Modernization Business Expenses

| Airport | Kind | Amount (in million \$) |
|----------------------------|---------------|---------------------------|
| Sunan airport in Pyongyang | Modernization | 26 |
| Ahrang airport in Chungjin | Modernization | 8 |
| Wonsan airport | Modernization | 11 |
| Sinuiju airport | New | 85 |
| Total amount | | 130 |

Source: Won-bae Kim, "Basic Design of Infrastructure Development in the Korean Peninsula" (Anyang, Gyeonggi-do: Korea Research Institute for Human Settlements, last modified December 20, 2006), <http://library.krihs.re.kr/upload/publication/publication/2006-43.pdf>.

e. Logistics Development

During the initial 10 years after the unification, it is not necessary to invest in the logistics sector since the investment in other infrastructures and industry sectors is expected to have a ripple effect. Thus, this thesis expects that the government would spend its logistics expenditure beginning in mid-unification. If NK's economy catches up to that of SK's, the unification would need up to \$11 billion over 10 years.

f. Water Resources Development

In 2009, SK president Lee Myung-bak announced the Four River Development Plan involving the Han-river, Geum-river, Nakdong-river, and Yeongsan-river. To prevent frequent floods and manage water resources, the government invested \$20 billion

for four year. In the process, 96 reservoirs, five dams, and 16 weirs were installed.⁷⁹ Similarly, NK also has four major rivers: Yalu-river, Tumen-river, Yeseong-river, and Taedong-river. With SK's experience and technology, a unified government would be able to develop its water resources. Thus, \$20 billion would be needed to develop water resources for four years, and \$2 billion would be needed annually to maintain its facilities for 16 years.

g. *Regional Development*

In the 1970s, President Park carried out the *Saemaul* Movement to decrease the gap between urban and rural. To escape from poverty, the whole country participated in the movement. The core of the movement is the idea of not living well for me only, but living well for my village and for my country. The government supported basic raw materials and created competition environment. For a winning county, the government gave various benefit, including incentives and tax favors. The government spent about \$26.9 million every year for 10 years beginning in 1972 (see Table 29).⁸⁰ Taking into account the U.S. inflation rate, this figure means \$153 million in 2015.⁸¹

After 10 years of this movement, a unified government would need to spend a similar scale expenditure compared with SK to increase the quality of life and eliminate inequality. In consideration of the population gap between the two Koreas, the government would spend \$0.6 billion from beginning in the mid-unification period.

⁷⁹Jong-Ho Shin et al., “The Four Major Rivers Restoration Project in South Korea,” *Proceedings of the Institution of Civil Engineers* 164, no. 1 (2011): 19, doi:10.1680/cien.2011.164.19.

⁸⁰Hun You, “New Rural Budget Design,” *The Jibang-haeng Jung* 21, no. 229 (1972): 54, http://kiss.kstudy.com/journal/thesis_name.asp?tname=kiss2002&key=1774959.

⁸¹See http://intl.econ.cuhk.edu.hk/exchange_rate_regime/index.php?cid=7 and <http://www.in2013dollars.com/1972-dollars-in-2015?amount=26900000>.

Table 29. The 1972 *Saemaul* Movement Expenses in SK

| Classification | Number of Demand | Government Expenditure | Province Expenditure | City or County Expenditure | Total amount |
|------------------------------|------------------|------------------------|----------------------|----------------------------|--------------|
| Recreate village | 16,555 villages | 4,997 | 2,683 | 685 | 8,365 |
| Improve roof | 312,136 | 2,506 | 6,263 | 1,952 | 10,722 |
| Build farm road | 4,000 km | - | 1,835 | 671 | 2,506 |
| Water supply | 525 | 627 | 159 | 467 | 1,252 |
| Methane gas to supply energy | 9,000 | 380 | 29 | 207 | 616 |
| Well construction | 3,058 | 75 | 14 | 54 | 143 |
| Completion of the movement | 700 villages | - | 2,632 | - | 2,632 |
| Build model village | 10 villages | - | 602 | 50 | 652 |
| Total | 8,586 | 14,217 | 4,085 | | 26,888 |

Numbers are in thousand \$. Source: Hun You, "New Rural Budget Design," *The Jibang-haeng Jung* 21, no. 229 (1972): 54, http://kiss.kstudy.com/journal/thesis_name.asp?name=kiss2002&key=1774959.

h. Total Estimated Infrastructure Unification Cost

The aforementioned programs would provide the foundation for developing the whole country as well as industry. The government would need \$280.11 billion based on the value of the currency in 2014. Considering SK's expected inflation rate, this figure increases up to \$408.7 billion. Consequently, a unified government could not pay the total estimated infrastructure cost. About \$82 billion more would be needed.

4. Specific Distribution Suggestion

Although a unified government cannot pay the whole cost of infrastructure alone, the shortage would be overcome through transforming NK's inefficient railway. Table 30 and Table 31 present a detailed shortage amount.

Table 30. Distribution of Infrastructural Unification Cost from 2031–2050

| Classification \ Year | 2031-2035 | 2036-2040 | 2041-2050 |
|-----------------------------|---------------|--------------|----------------|
| Road Construction | 10 | 10 | 30 |
| Railway Construction | 8.5 | 8.5 | 120 |
| Harbor Modernization | 2.425 | 3 | 11.525 |
| Airport Modernization | 0.065 | 0.065 | 5.5 |
| Logistics Development | - | - | 11 |
| Water Resources Development | 22 | 10 | 20 |
| Regional Development | 0.765 | 0.765 | 6 |
| Total | 43.755 | 32.33 | 204.025 |

Costs shown are the value of currency in 2014. Numbers are in billion \$.

Table 31. Distribution of Infrastructural Unification Cost

| Classification \ Year | 2031-2035 | 2036-2040 | 2041-2050 |
|-----------------------------------|----------------|-----------------|-----------------|
| Road Construction | 14.59 | 14.59 | 43.77 |
| Railway Construction | 12.4015 | 12.4015 | 175.08 |
| Harbor Modernization | 3.538 | 4.377 | 16.815 |
| Airport Modernization | 0.095 | 0.095 | 8.025 |
| Logistics Development | - | - | 16.049 |
| Water Resources Development | 32.098 | 14.59 | 29.18 |
| Regional Development | 1.116 | 1.116 | 8.754 |
| Total | 63.8385 | 47.1695 | 297.673 |
| The money which SK can pay | 69 | 78.2 | 179.4 |
| Shortage amount | +5.1615 | +31.0305 | -118.273 |

Costs shown are the value of currency in 2030. Numbers are in billion \$.

A unified government is able to deal with the development of infrastructure on its own in the early unification. NK's railway, however, needs to transform its system. If it cannot change, the government would need a large amount of money to manage it. Today, its train system is very inefficient, and its railway is designed for military purposes. To transport military supplies, its system is connected to the north and south, rather than east and west. If a unified government innovates its system and removes inefficient railways, the infrastructural unification cost would be reduced, and the government would be capable of covering its costs.

5. Government's Work in Infrastructure

Infrastructure has the ability to provide indispensable capital to support and promote production activity. Thus, it is also called social overhead capital. In SK, infrastructure is a system that is a foundation of production activity, that promotes the usefulness of diverse facilities, or that provides life conveniences for people. In other words, traffic facilities and land development are staple factors in SK's infrastructure.

SK's infrastructure has the following characters: first, its components cover a wide field. It is impossible for the government to manage detailed programs. Thus, public enterprises manage whole investment and safety. In addition, the character of investment in infrastructure is comprehensive. In other words, the government cannot install only the necessary facilities; additional facilities should also be constructed. For example, rest areas and service areas should be constructed on the highways. Second, it needs a long time to recover its investment because of its comprehensiveness. Third, infrastructure has the characteristic of public goods: it provides benefits to unspecified individuals.⁸²

Because of these characteristics, the role of a unified government is important in the early stage of unification. Although it is difficult for the government alone to deal with NK's infrastructure, the government can overcome its economic burden with NK's railway reform while maintaining the current system. The investment in infrastructure influences the whole industry, including production and consumption. Moreover, it indirectly supports the industrial sectors, so it helps to improve productivity and raise the country's competitiveness. For example, the investment in roads contributes to reducing logistics costs, promoting diverse investments, and raising the competitiveness of one's product by decreasing production cost. Therefore, a unified government should pay attention to its infrastructural expenditure.

To develop NK's economy, Kim's regime should spend more money on infrastructure, considering its ripple effect. However, NK's investment in infrastructure is a great danger to NK, which has a weak economy and isolated systems. Thus, the regime should follow China's economic model of a gradual opening. In addition, before the

⁸² Cho et al., *A Research on the Costs and Benefits of Korean Unification*, 334.

unification, cooperation between the two Koreas would reduce the risk and provide a ripple effect to NK's whole industry.

Through the KIC, SK has learned about business activities, establishing infrastructure, and treatment of workers in NK. SK businessmen may recognize a difference between the two Koreas. Therefore, SK officials need to review these experiences and present optimal ways to maximize the balanced growth of NK's economy. In addition, the SK government needs to guarantee businesses' activities in NK in the early unification. Because of the risk of uncertainty, FDIs would not be able to easily come to NK.

On August 25, 2015, there was a meeting of the two Korean high-ranking officials. Thank to this meeting, the two Koreas agreed to cooperate in various fields. SK should continue to restore the past North–South cooperation projects, as occurred in meetings and dialogue in the late 1990s and the early 2000s. These projects, however, should not result in activities or projects that maintain Kim's regime. With precise monitoring, the SK government needs to focus on infrastructure construction to raise the quality of life in NK. Based on principles and trust, the government must draw Kim's regime into international society while also eliciting economic support and guaranteeing its system.

I. CONCLUSION

This chapter explores how much the SK government would be required to pay in three sectors: manufacturing, the food industry, and infrastructure. To improve NK's economy, the development of these elements are necessary, and they cannot be privatized in the early unification. Thus, a unified government's expenditure in the three areas should be efficient and systematic.

In manufacturing, a unified government could pay its unification cost within its budget during the initial five years. According to the development of NK's economy, however, industrial subsidies would increase; as a result, the government's burden would also increase. From the mid-stage of unification, the investment of private enterprises in SK and MNCs should be active in order to reduce the economic burden of the

government. To attract various investment, a unified government should reform NK's economy through restructuring. Initial successful reform could give various investors credit; as a result, the government could overcome its deficit in the late stage of unification.

Since NK has lasted severe food crises, the reform of NK's agriculture would be needed immediately after the unification. With the abolition of collective farms, a unified government would contribute to increase its agricultural productivity and profits; however, if the government follows SK's food programs and policies, it would face a serious deficit. To increase its agricultural competitiveness, the SK government has provided diverse subsidies for farmers. These policies could have a reverse effect on rural households in NK. In addition, to protect domestic farmers, the agricultural sector is a difficult sector in which to introduce FDI. Consequently, the government should encourage farmers to increase competition by disseminating farming technology and knowledge, rather than giving subsidies.

The development of infrastructure would indirectly contribute to different industrial development and help to enhance national competition. Thus, in the early unification, a unified government would be necessary to increase its expenditure. After the end of the Korean War in 1953, NK concentrated on constructing railways to enable a stable supply of war materials; however, its railways are inefficient. To accomplish balanced growth, a unified government needs to reform its railway system and develop its road system to reduce logistical costs. If the government maintains NK's railway, it would be required to pay beyond its budget; however, successful reforms in railway would give financial stability to the government. Consequently, the government should strive for a transition to the balanced transport system of rail and road.

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IV. COST AND BENEFIT OF INTERNATIONAL COMMUNITY

Since the world is closely connected, Korean unification would have a ripple effect throughout the global economy. With SK's technology, the North's economy will be activated, and a unified Korea may be on par with China and Japan in terms of economic indicators. From the United States' perspective, unification would remove WMDs, realize democracy in NK, and reduce trade dependence on China. From the Chinese perspective, Korean unification may mean the defeat of communism, but also the development of northeastern China, Manchuria. This area would be a logistics center by connecting the Eurasian continent and the Pacific Ocean. From the Russian perspective, unification can also develop Far East Russia. Energy export expansion, the Siberian railway expansion, and gas pipeline expansion would give enormous benefits to the Russian economy. From the Japanese perspective, a united Korea may be its rival in the global market. Many Japanese, however, think North Korea is the major threat to their security. Thanks to Korean unification, the Japanese could banish their fears, such as the kidnapping issue, missile tests, and nuclear programs. In addition, the help of the Japanese could be a step on the ladder to achieving peace in East Asia. After receiving support from the Japanese, Koreans could suppress their long-standing anger toward the country. In this regard, Korea and Japan can become good neighbors to each other.

It is difficult for SK to achieve unification on its own because of the geopolitical relationships in East Asia. Thus, to unify with NK, SK needs the help of surrounding powerful countries, and the Koreas will be able to persuade these other countries by estimating security and economic effects. In effect, the help of surrounding countries will give enormous benefits that outweigh the cost of unification. In this context, this chapter deals with the two most influential countries to Korea among the four already discussed—the United States and China.

A. THE NECESSITY OF THE INTERNATIONAL COMMUNITY'S HELP

1. Limitation of a Unified Korea's Government

As described in Chapter III, this thesis assumed a unified government would follow SK's budget programs, and it explored NK's unification cost in manufacturing, food industry, and infrastructure. Through researching SK's experience and citing scholars' research, this thesis found the following results. First, a unified government will need a lot of money to develop NK's industry, but the ROK government will overcome this economic burden with the help of MNCs and the private sector. About \$72 billion will be needed from the international society. Second, if a unified government follows SK's agricultural budget system, it will not be able to adequately manage NK's agriculture. Therefore, the government should lead NK's agricultural competitiveness by spreading agricultural techniques, focusing on high value-added crops, and encouraging its diverse agricultural products, rather than giving subsidies. Third, if a unified government reforms NK's railway sector, it will have to deal with NK's infrastructure within its capability. Because of NK's inefficient and extensive railway, it will take a lot of money in infrastructure if a unified government maintains its railway. Therefore, the government should reform NK's railway and build systematic roads immediately after the initial unification. In the medium and long term, ship and air capabilities should also be developed.

Since NK has an isolated and closed economic structure, uncertainty is great; however, the fact that a unified government cannot cover the unification cost within its economic capability produces even more uncertainty. To reduce uncertainty, SK should draw on the support of the international community. Its support would not only reduce the uncertainty, but would also stabilize NK's economy. Above all, international efforts will promote NK's change and achieve Korean unification faster than expected.

2. Development Possibility

Korean unification will provide a huge economic benefit to the two Koreas if they can overcome their economic burden with the help of the international community. On a related note, Marcus Noland analyzed the effects of NK's economic opening in

2000 using Computable General Equilibrium models. According to his arguments, for NK, “product market integration would generate large welfare gains, sufficient to end the famine.”⁸³ For SK, “the impact of product market integration would be trivial, but the impact of factor market integration would be considerable, affecting the composition of output, distribution of income, and rate of growth.”⁸⁴ He presented two integration scenarios. “The first scenario is the formation of a customs union that involves the elimination of North Korean quantity rationing of trade, the elimination of infra-Korean barriers to trade, and the adoption of South Korean tariffs as the common external barrier.”⁸⁵ The second set of simulations is related to various forms of factor market integration.⁸⁶ As a result, to overcome the food crisis, NK has focused on its agricultural sector, specifically laborers and resources. Thus, a unified government would need to redistribute these individuals and assets to other industries, such as light manufacturing and construction.⁸⁷

In addition, to reform NK’s economy, FDI and exodus of laborers are necessary. Noland insists that “more than \$600 inflow and the emigration of two million workers would be necessary to reach the per capita income target.”⁸⁸ These changes would alter the composition of output in NK (see Figure 5). External capital inflow would also affect the real exchange rate. Although the increase of the real exchange rate negatively influences NK’s trade, the total trade volume would most likely significantly increase.

⁸³Marcus Noland, Sherman Robinson, and Tao Wang, “Modeling Korean Unification,” *Journal of Comparative Economics* 28, no. 2 (2000): 400, <http://torpedo.nrl.navy.mil.libproxy.nps.edu/tu/ps/doc.html?dsn=2140832>.

⁸⁴Ibid.

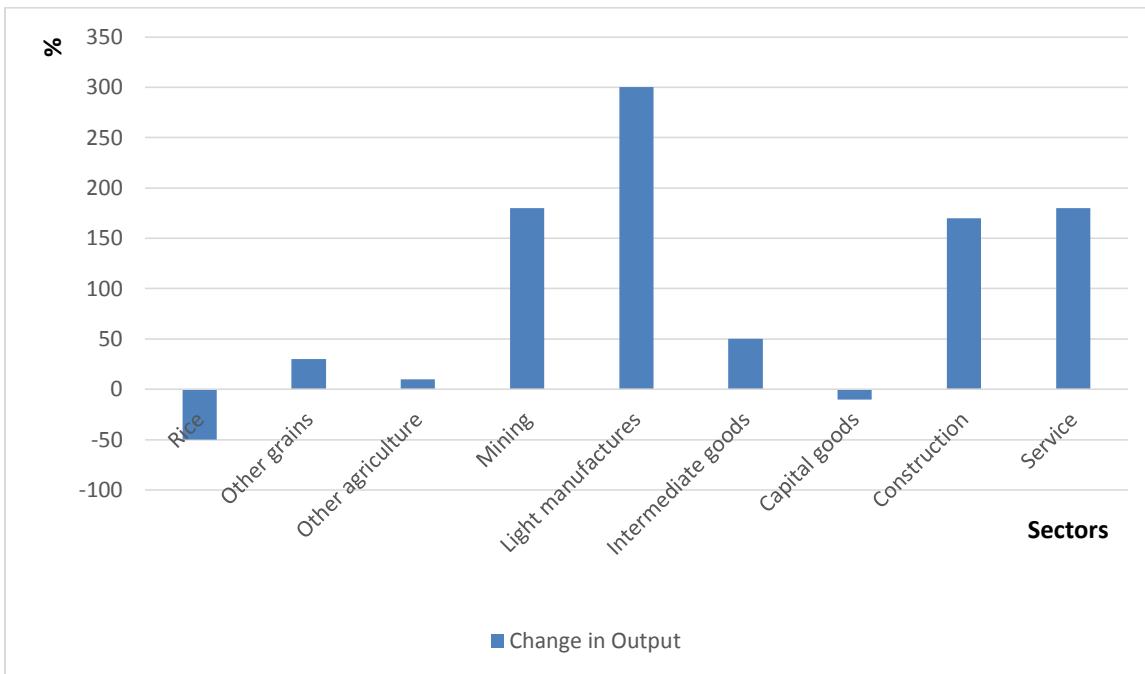
⁸⁵Ibid., 406.

⁸⁶Ibid.

⁸⁷Ibid., 409.

⁸⁸Ibid., 411–12.

Figure 5. External Capital Inflow Case: Composition of Output Change in NK



Source: Marcus Noland, Sherman Robinson, and Tao Wang, "Modeling Korean Unification," *Journal of Comparative Economics* 28, no. 2 (2000): 400, <http://torpedo.nrl.navy.mil.libproxy.nps.edu/tu/ps/doc.html?dsn=2140832>.

In the agricultural sectors, land that was used for the low productivity of rice will be redistributed. As a result, the outputs of other grains and agriculture will increase. According to the industrial development, the unified Korea's trade volume would increase significantly; particularly, the output of light manufactures will show marked improvement.

Economic integration will be accompanied by a reduction in political conflict on the Korean peninsula. In his articles, Noland presented the effect of easing political tension:

- We reduced military expenditures in North and South Korea to the Organization for Economic Cooperation and Development (OECD) average of 2.5% of GDP. For South Korea, this peace dividend would be relatively minor, less than \$300 million. However, for the far more militarized North Korea, the impact would be much larger and add another 10% to GDP on top of the gains from formation of the customs union. In this scenario, North Korea would achieve the FAO/WFP/UNDP total

normal demand target of 7.8 million metric tons. For the peninsula as a whole, the peace dividend would be 0.3% of GDP. Per capita income in the North would remain less than a tenth of that in the South under this scenario.⁸⁹

- Thanks to NK's vigorous economic activity and reduced threats, the peace dividend will also occur among neighboring countries as well as the United States.

B. ESTIMATED BENEFITS FOR THE UNITED STATES

1. Security

On July 15, 2015, the Joint Comprehensive Plan of Action between P5+1, the European Union, and Iran was announced. Through the Iran deal, the world moved one step closer to fulfilling denuclearization. After the deal was announced, however, “Iran’s supreme leader, Ayatollah Khamenei, said that Iran would never accept unfettered inspection of its military facilities.”⁹⁰ This statement contains a concerning message that Iran may follow NK’s wrong lessons from 1994. Although “the United States and its international partners have reached an historic deal that will verifiably prevent Iran from obtaining a nuclear weapon,”⁹¹ critics argue that this agreement cedes too much military and economic power to an untrustworthy state. On the other hand, Korean unification will remove these fears and encourage verification procedures under the International Atomic Energy Agency’s (IAEA) monitoring.

The U.S. government argues in Nuclear Posture Review, “The United States is committed to renewing and strengthening the Nuclear Non-Proliferation Treaty and the global nuclear non-proliferation regime it anchors to cope with the challenges of non-compliance and of the growth of nuclear power.”⁹² Specifically, it has tried to encourage the nonproliferation regime by reversing the nuclear ambitions of North Korea and Iran,

⁸⁹Ibid., 410.

⁹⁰Max Boot, “Why Is the Iran Deal Bad? Think North Korea,” *LA Times*, July 21, 2015.

⁹¹The White House, “The Iran Nuclear Deal: What You Need to Know about the JCPOA,” July 14, 2015, https://www.whitehouse.gov/sites/default/files/docs/jcpoa_what_you_need_to_know.pdf.

⁹²U.S. Department of Defense, ‘Preventing Nuclear Proliferation and Nuclear Terrorism,’ in *Nuclear Posture Review Report* (April 2010), <http://archive.defense.gov/npr/docs/2010%20Nuclear%20Posture%20Review%20Report.pdf>.

strengthening IAEA safeguards, creating consequences for non-compliance, impeding sensitive nuclear trade, and promoting the peaceful use of nuclear energy without increasing proliferation risks.⁹³ The denuclearization of the Korean peninsula would match with the goal of the United States. Although nuclear programs can be attractive for a unified Korea to increase its security, the government will give them up considering the cost of nuclear development.

NK joined the Biological Weapons Convention in March 13, 1987, but it has still developed biological weapons. SK's Defense White Paper said that NK's "military turned to the development of biological weapons according to Kim Il-sung's directive that 'poisonous gas and bacteria can be used effectively in war in the 1980s.'"⁹⁴ Moreover, a Russian intelligence report from the early 1990s and the testimony from North Korean defectors apparently presents that NK has been or could be developing various biological agents.⁹⁵

Since these weapons are able to destroy society, the United States has tried to prevent their spread. In November 1969, President Nixon announced that the United States discontinued its biological weapons program and ended its research for their development. The control of biological weapons, however, is difficult for the United States and its allies. Through the example of Aum Shinrikyo, we know that the effort to prevent biological terrorism is not easy. The multi-use nature of biotechnology is the primary obstacle. Furthermore, "biological weapon programs are easier to hide than most military programs because they can be developed in a university setting or hidden within efforts to develop related vaccines."⁹⁶ It is also hard to distinguish their offensive and defensive applications. Because of these issues, and since terrorists sent the anthrax

⁹³Ibid., 9–10.

⁹⁴ROK Ministry of National Defense, *Defense White Paper* (Seoul: ROK Ministry of Defense, 2000), 58.

⁹⁵Bruce W. Bennett, *The Challenge of North Korean Biological Weapons* (Santa Monica, CA: RAND, 2013), 3–4, <http://www.rand.org/pubs/testimonies/CT401>.

⁹⁶Ibid., 3.

letters to media outlets and Senate offices in the United States in 2001,⁹⁷ the United States is determined to prevent the biological attacks. To eradicate biological attacks, the United States and its allies require continued international cooperation. Thanks to Korean unification, North Korea, which has the third largest biological weapons in the world, may eradicate its weapons and achieve international objectives.

According to the defense white paper of SK, “North Korea began producing chemical weapons in the 1980s and it is estimated that it has about 2,500 to 5,000 tons in stock.”⁹⁸ Through Korean unification, the international community as well as the United States can remove the fear of chemical weapons. “In May 1991, President Bush committed the U.S to destroy all chemical weapons and to renounce the right to chemical weapon retaliation.”⁹⁹ Lastly, the “20-year history of U.S. chemical weapons destruction, with almost 22,000 metric tons of deadly agents safely eliminated, illustrates well the deep commitment of the United States to abolish its Cold War arsenal.”¹⁰⁰ In addition, the United States and its allies destroyed hundreds of bombs and artillery rounds filled with deadly mustard agent with the Organization for the Prohibition of Chemical Weapons (OPCW) in Libya. The removal of NK’s chemical weapons will increase the world’s security, and a unified Korean government will be more likely to cooperate and make a commitment to the Chemical Weapons Convention (CWC) nonproliferation.

2. Economy

After the unification, Marcus Noland argues that the commodity trade volume between the United States and NK would be about \$370 million (see Table 32). Overall, he expects NK’s trade volume would increase eight times its current volume (see Table 32).

⁹⁷Gregory Koblentz, “Pathogens as Weapons: The International Security Implications of Biological Warfare,” *International Security* 28:3 (Winter 2003/2004), 84, <http://belfercenter.ksg.harvard.edu/files/koblentz.pdf>.

⁹⁸ROK Ministry of National Defense, *Defense White Paper*, 32.

⁹⁹Frederick J. Vogel, *The Chemical Weapons Convention: Strategic Implications for the United States*, (Carlisle Barracks, PA: U.S. Army War College, 1996), 9.

¹⁰⁰Paul F. Walker, “Abolishing Chemical Weapons: Progress, Challenges, and Opportunities,” *Arms Control Today* 40, no. 9 (November 2010): 3, <http://search.proquest.com/openview/cd82ff3fde274f40bb1a9ac702c8d8d1/1?pq-origsite=gscholar>.

Table 32. Korean Unification Effect of NK's Trade Partners

| Partner | Real | Natural Trade Model | | CGE Model (Matured NK's economy) | |
|----------------------|-----------------------|---------------------|---------------|-------------------------------------|---------------|
| | Real trade in 2012 | Expected Trade | Expected/Real | Expected Trade | Expected/Real |
| SK | 1,963.19 | 50,278.70 | 25.6 | 132,492.30 | 67.5 |
| China | 6,160.65 | 12,638.47 | 2.1 | 33,304.35 | 5.4 |
| Japan | 0 | 2,781.36 | N/A | 7,329.33 | N/A |
| U.S. | 13.13 | 364.76 | 27.8 | 961.20 | 73.2 |
| Russia | 74.33 | 289.23 | 3.9 | 762.18 | 10.3 |
| Total world trade | 8,905.47 | 67,589.66 | 7.6 | 178,109.40 | 20.0 |

Numbers are in million \$. Source: Marcus Noland, "A Study to Analyze Cost-Benefits of the Reunification of Korean Peninsula to the United States" (Seoul: Ministry of Unification, last modified February 16, 2015), <http://www.unikorea.go.kr/content.do?cmsid=3096&mode=view&page=&cid=42366>.

NK's trade volume would increase with the abolition of the UN resolution. Based on this comparative advantage, resources would be redistributed, and NK's income would greatly increase. With the development of NK's economy, its trade with the United States would reach about \$1 billion. Considering the comparative advantage of the United States, NK would export light manufactures. Noland expects that the volume would be from \$370 million to \$1 billion.¹⁰¹ In contrast, NK would import grains, capital goods, and intermediate goods from the United States. For example, Apple makes iPhones in China because it can reduce production costs with cheap labor; similarly, U.S. corporations would be able to use cheap labor in North Korea. In addition, NK's mining is also a good source for the production of electronics.

Marcus Noland also expects that NK's service trade with the United States would be up to \$430 million.¹⁰² The United States would export business and professional services; NK would export traveling and tourism services to the United States. Thanks to Korean unification, increasing attention would generate a larger tourism income. It is

¹⁰¹Noland, "A Study to Analyze Cost-Benefits of the Reunification of Korean Peninsula to the United States," 115.

¹⁰²Ibid.

likely that about 1.1 million Korean Americans¹⁰³ would visit a unified Korea at least once.

In sum, after Korean unification, NK's commodity trade volume with the United States would expand to approximately one billion dollars, and its service trade would be an additional \$430 million annually. Although the unification could require a lot of money, the United States would play a crucial role through international organizations. The fiscal situation of the United States' government would influence the amount of its support toward NK, but the investment of U.S. private sectors can also affect NK's support. They can transfer advanced technological skills, build a system providing global distribution networks, and provide a successful market campaign for NK in the global market. Consequently, NK could not only develop its industry and economy, but also remove its past negative image or memory.

C. ESTIMATED BENEFITS FOR CHINA

Today, China has a great influence over the Korean peninsula. In response to President Park's request, "Xi Jinping has repeatedly advocated an evolutionary approach to unification, thereby rejecting any abrupt or riskier strategies."¹⁰⁴ For China, the status quo of the Korean peninsula is a major obstacle to the development of Northeast China. Consequently, China advocates peaceful Korean unification; for example, if NK opens its closed doors, this would promote reforms and open market policies. The recalcitrant regime in NK, however, has sometimes ignored the advice of China and argues for socialism of its own, the *Juche* ideology. Since there is no attractive alternative, moreover, China has maintained the status quo policy towards the two Koreas; however, in the unification process, a proactive role by China may provide an opportunity to increase the status of China in Asia.

¹⁰³Jie Zong and Jeanne Batalova, "Korean Immigrants in the United States" (Washington, DC: Migration Policy Institute, December 3, 2014), <http://www.migrationpolicy.org/article/korean-immigrants-united-states>.

¹⁰⁴Pollack, "Is Xi Jinping Rethinking Korean Unification?"

1. Security

The Korean peninsula is a place where marine forces and continental forces concentrate and collide. Historically, when there are two forces, the one that occupies the Korean peninsula has had a strategic advantage compared with the one that does not. Consequently, China perceives it as a buffer zone for protecting its forces. In modern Asian history, the areas surrounding China, including the Korean peninsula, have had a significant influence on Chinese national interests. Until now, the conflict on the Korean peninsula has been a burden to China, and China has increased its armaments to deal with it. NK's nuclear programs justified the Asian strategy of the United States, it but also provided a reason for Japan's military normalization. As a result, the triple alliance—United States, ROK, and Japan—is a big threat to China because of the U.S. policy of containment. In addition, an unstable situation on the Korean peninsula can also affect other regions of China. Since China consists of 55 ethnic groups, any external threats could have a significant effect on its internal political environment.

If Korean unification is achieved, the intervention of neighboring powerful countries would be reduced in the two Koreas. A peaceful atmosphere and a mood of reconciliation would reduce the geopolitical value of the Korean peninsula. In contrast, its geoeconomic value would increase. With enormous investment, the cooperation of the international community would bring stability to the region; as a result, China could be provided with a good environment for performing a local strategy based on its geographical proximity in Northeast Asia. In this regard, China would be able to expand its influence in East Asia.

Since the Tiananmen crackdown in 1989, Chinese leaders have stressed its historical humiliation between 1895 and 1945 and recent outstanding economic development; the Chinese see that they need to combine domestic forces together to prevent a repetition of that humiliation. While the Chinese Communist Party (CCP) is stressing economic development and its humiliation, its efforts is the power to maintain the CCP's regime, not the ideology of socialism. Thus, the economic benefits of Korean unification for China could attract Chinese support. As a result, changes in the security

environment would provide a favorable opportunity for the CCP, and China could achieve its local strategic goals with geographical advantages.

2. Economy

Northeastern China would get an economic benefit from Korean unification. Economists expect the development of transportation logistics in the area since the Eurasian continent and the Pacific Ocean would be connected. By constructing a railway from west to east in the peninsula, northeastern China's access to the Pacific becomes possible; as a result, it would further China's economic development. In addition, if Korea and Japan build an undersea tunnel between the two countries, logistics would increase significantly; the ripple effect would be tremendous. "Some economists forecast that a unified Korea would contribute at least an average of 0.2–0.5% increase in China's annual GDP. Based on the 2011 figures, the annual economic benefit is expected to be a minimum of \$14.6 billion to \$36.5 billion, which is a sizable contribution to the state."¹⁰⁵

Thanks to various FDI in NK, the northeast of China would also get a huge market-opening effect. "Economic effects engendered from increased openness of the three provinces of northeast China due to Korean unification will be considerable. Increased openness of the three northeast Chinese provinces by itself is expected to generate economic benefits of about 283.6 billion (RMB)." ¹⁰⁶ In addition, if NK carries out a wholesale opening up of its economy, the investment in Liaoning, Jilin, and Heilongjiang province, which are northeast Chinese provinces, would also increase. Jin Jingi, who is deputy director of the Korean Research Center at Beijing University, argues that the GDP of the three northeast Chinese provinces would achieve about 51 billion RMB, their export would increase up to \$992 million, and retail consumer goods would be nearly 36 billion RMB if FDI in three provinces rises by 1% in 2020.¹⁰⁷

¹⁰⁵Pak, "China's Cost-Benefit Analysis of a Unified Korea," 45.

¹⁰⁶Jingi Jin, "Cost-Benefit Analysis of China due to Korean Unification" (Seoul: Ministry of Unification, last modified February 16, 2015), 58, <http://www.unikorea.go.kr/content.do?cmsid=3096&mode=view&page=&cid=42632>.

¹⁰⁷Ibid.

In Northeast Asia, there is no economic cooperation organization, such as the North American Free Trade Agreement (NAFTA) and Association of South East Asian Nations (ASEAN). China also hopes to establish of such organizations to maximize its development. Although there are economic superpowers around it, China has not had enough economic effect because of historical conflicts and maritime disputes. Northeast Asia is one of the concentrated areas of capital, technique, resources, and populations. If three countries establish an international cooperation organization, the effect would be tremendous. By creating a peaceful atmosphere, Korean unification provides an opportunity for China to build economic cooperation and also provides the foundation for correcting regional imbalances in China.

D. SUGGESTIONS FOR ROK TO ACHIEVE THE UNIFICATION

1. The United States

According to Noland, “the United States has a strong economic and political interest in seeing Korea unification as a democratic capitalist state. The specifics of U.S. interests and involvement in unification are partly contingent on scenario.”¹⁰⁸ Excepting unification through military conflict, however, Korean unification would have a positive impact on the United States. Consequently, SK needs to frequently mention the need for the unification and work to gain the United States’ support.

In the alliance, states can improve their security through their military cooperation, but they should also sacrifice some degree of autonomy in their policy. In other words, there is an exchange relationship between security and autonomy. Because of the nature of this relationship, SK sometimes suffers an alliance dilemma. Glenn H. Snyder presented the security dilemma in alliance politics. Since alliances are never absolutely firm in a multipolar system or international anarchy, “the fear of being abandoned by one’s ally is ever-present.”¹⁰⁹ On the other hand, because of the alliance, states have the risk of entrapment which “means being dragged into a conflict over an

¹⁰⁸Noland, “A Study to Analyze Cost-Benefits of the Reunification of Korean Peninsula to the United States,” 144.

¹⁰⁹Glenn H. Snyder, “The Security Dilemma in Alliance Politics,” *World Politics* 36, no. 4 (1984): 466, <http://www.jstor.org/stable/2010183>.

ally's interests that one does not share, or shares only partially.”¹¹⁰ The risks of abandonment and entrapment are inversely moving. In other words, reducing one increases the other. This causes an alliance dilemma. According to Snyder's theory, “the more dependent a state is, the more likely it is that the costs and risks of abandonment will outweigh the costs and risks of entrapment.”¹¹¹

In the case of Korean unification, the action of SK to gain the support of China can sometimes raise the risk of abandonment. To minimize the dilemma, Snyder suggests that two countries should be closely linked by strategic interests. The ROK, the more dependent state, needs to match its strategic interests with that of the United States. In addition, “a vague or ambiguous agreement tends to maximize fears of abandonment; an explicit one minimizes such worries.”¹¹² Thus, through continuous dialogue, compromise, and explicit agreement, the ROK should persuade the United States and be proactive in unification.

2. China

China has a concern that a unified Korea will put forth a thoroughly pro-American policy. Moreover, territorial dispute and historical conflict between China and Korea would also be potential conflict factors. In this regard, Korea needs to take a neutral attitude. While attracting China's support about Korean unification, it should beware of the alliance dilemma with the United States.

President Park attended China's WWII 70th anniversary parade on September 3, 2015. Xi Jinping praised Park's effort to improve the relationship. He said, “the Korea-China relationship has become the best-ever national relationship in history.”¹¹³ As evidence, he pointed out the free trade agreement between China and South Korea, as well as Seoul's decision to join the China-led Asian Infrastructure Investment Bank

¹¹⁰Ibid., 467.

¹¹¹Ibid., 472.

¹¹²Ibid., 473.

¹¹³Shannon Tiezzi, “South Korea's President and China's Military Parade,” *Diplomat*, September 3, 2015, <http://thediplomat.com/2015/09/south-koreas-president-and-chinas-military-parade>.

(AIIB).¹¹⁴ To change Pyongyang's attitude, Park has sought closer cooperation with China since China has a big influence on NK. In this regard, SK's efforts can continue a desirable cooperation. To maximize the result of its efforts, the two countries should have continuous economic exchanges with NK. For example, the establishment of many SEZs would promote a change in NK. In the case of NK's nuclear issues, moreover, China's cooperation is also essential to urge NK to return to the negotiation table. With the UN resolution, the six-party talks should prepare a package of incentives for NK to give up its nuclear development program, like the Iran deal.

From the Korean perspective, China is not only a neighbor country, but also one of the most influential countries. As Korean unification affects China's positive national interests in terms of strategy, economy, and security, Korea may be able to attract China's support. Since NK's sudden collapse or a military conflict of the two Koreas would lead to a serious crisis in China, however, China would only support a peaceful unification. Therefore, the ROK government needs to stress peaceful unification plan and should lead NK to join the international community through the promotion of a sustainable relationship with China.

E. CONCLUSION

Powerful countries have "a strong economic and political interest in seeing Korea unified."¹¹⁵ To unify with NK, the ROK government needs their help, and the two Koreas will be able to persuade them by estimating security and economic effects. The United States supports the idea that a unified Korea would be a democratic capitalist state.¹¹⁶ If the unification is accomplished, the trade between the United States and NK would increase up to "approximately \$1 billion, with a possible additional \$300–425 million in services trade."¹¹⁷ In addition, the United States could peacefully remove WMDs and nuclear programs in NK.

¹¹⁴Ibid.

¹¹⁵Noland, "A Study to Analyze Cost-Benefits of the Reunification of Korean Peninsula to the United States," 144.

¹¹⁶Ibid.

¹¹⁷Ibid.

In the unification process, the U.S. government could shoulder Korean unification costs to achieve nonproliferation, but the investment of U.S. firms would be a more effective and realistic solution, since the financial assistance of the United States could be a burden for the U.S. government and because the budget of a unified Korean government could bear the unification cost through its food industry and infrastructure. Since the government could not overcome the unification cost through manufacturing, it is better to support finance, technology, and the international marketing program from private sectors.

Since it is the most supportive country to NK, China holds the key to achieve Korean unification. The aforementioned security and economic benefits for China would be able to attract China's support of Korean unification. From a geopolitical perspective, a peaceful atmosphere of unification would reduce the danger of military conflicts in East Asia. Since an investment is required to create a safer environment on the Korean peninsula, the geopolitical conflict would reduce. Conversely, the geoeconomic value would increase: "China's expected benefit from business cooperation and investments with a unified Korea would be far greater than its incremental cost from the increased military deployment along the border after unification."¹¹⁸ In addition, according to Jin Jingi, the GDP of the three northeast Chinese provinces would achieve about 51 million RMB, their export would increase up to \$992 million, and retail consumer goods would be nearly 36 billion RMB if FDI in three provinces rises by 1% in 2020.¹¹⁹

In March 2014, President Park laid out a concrete roadmap of SK's unification agenda at the former East German city of Dresden. She proposed "'humanity, co-prosperity, and integration' of the two Koreas"¹²⁰ to NK. Under her humanitarian agenda, she made a proposal including the regularization of the family reunions between the two Koreas, an establishment of systems to promote co-prosperity of the two Koreas, and the promotion of inter-Korean projects, such as SK's infrastructure-building

¹¹⁸Pak, "China's Cost-Benefit Analysis of a Unified Korea: South Korea's Strategic Approaches," 25.

¹¹⁹Jin, "Cost-Benefit Analysis of China due to Korean Unification," 58.

¹²⁰Ellen Kim, "President Park Geun-hye's Dresden Declaration," *CSIS Asia Program Blog*, April 10, 2014, <http://cogitasia.com/president-park-geun-hyes-dresden-declaration>.

investments.¹²¹ These contents are similar with the One-China policy toward Taiwan. Chinese policies for peaceful unification stressed economic ties, improving relations, and an unstinting commitment. In this regard, President Xi agreed with her Dresden declaration despite the NK's opposition. Consequently, the ROK government can persuade China to achieve peaceful Korean unification by stressing its appropriateness and its benefits for China.

¹²¹Ibid.

V. CONCLUSION

Koreans wish for the unification of the two Koreas; they even sing a song of unification when they are children. Many Koreans, however, have changed their mind because of the economic burden of unification. Through two economic crises, the 1997 Asian financial crisis and the 2008 global recession, they have considered economic abundance as a high priority; as a result, many South Koreans hesitate to support unification. Many German people have said that peace and freedom cannot be calculated in financial costs. Although the two Koreas have a common ethnicity, cultural experience, and historical justice, the relationship between them has been aggravated over the past 70 years.

During the march of hardships in the 1990s, large-scale famine took between 200,000 and 3.5 million human lives, and human rights were also in danger.¹²² Without policies to deliver sustained economic growth, the living environment in NK will not improve; however, NK has maintained its ideology and its tight foreign policy to preserve its regime. As a result, the human rights and economic situation are disastrous in NK. In addition, differences between the two Koreas have increased since the Korean War. As time goes by, their culture, thought, and lifestyle have become increasingly different. In this regard, Korean unification could unify the characteristics of the Korean people as well as resolve the terrible life circumstances of the North Korean people.

Kim's regime has tried to find a solution to the continuous economic crisis in NK; for example, NK established SEZs near the border with China and SK. However, since it insists on maintaining its closed economy, NK's efforts did not lead to a boost in foreign investment. Nevertheless, the Kim regime has continued to enjoy luxury. Since NK considers that maintaining its system is the most important value, it cannot overcome its economic crisis without an open-door policy. Thus, SK should find a method to draw NK into the international community. In the long-term, increasing exchanges between the two

¹²²Gabroussenko, "Calls for Self-Sacrifice," 40.

Koreas would lead to Korean unification. German unification showed that a well-prepared unification reduces the unification cost and social chaos.

This thesis explores how much the SK government would be required to pay in three sectors: manufacturing, the food industry, and infrastructure. To improve NK's economy, the development of these elements are necessary, and they cannot be privatized in the early unification. Thus, a unified government's expenditure in the three areas should be efficient and systematic.

In manufacturing, a unified government could pay its unification cost within its budget during the initial five years. According to the development of NK's economy, however, industrial subsidies would increase; as a result, the government's burden would also increase. From the mid-stage of unification, the investment of private enterprises in SK and MNCs should be active in order to reduce the economic burden of the government. To attract various investment, a unified government should reform NK's economy through restructuring. Initial successful reform could give various investors credit; as a result, the government could overcome its deficit in the late stage of unification.

Since NK has lasted severe food crises, the reform of NK's agriculture would be needed immediately after the unification. With the abolition of collective farms, a unified government would contribute to increase its agricultural productivity and profits; however, if the government follows SK's food programs and policies, it would face a serious deficit. To increase its agricultural competitiveness, the SK government has provided diverse subsidies for farmers. These policies could have a reverse effect on rural households in NK. In addition, to protect domestic farmers, the agricultural sector is a difficult sector in which to introduce FDI. Consequently, the government should encourage farmers to increase competition by disseminating farming technology and knowledge, rather than giving subsidies.

The development of infrastructure would indirectly contribute to different industrial development and help to enhance national competition. Thus, in the early unification, a unified government would be necessary to increase its expenditure. After

the end of the Korean War in 1953, NK concentrated on constructing railways to enable a stable supply of war materials; however, its railways are inefficient. To accomplish balanced growth, a unified government needs to reform its railway system and develop its road system to reduce logistical costs. If the government maintains NK's railway, it would be required to pay beyond its budget; however, successful reforms in railway would give financial stability to the government. Consequently, the government should strive for a transition to the balanced transport system of rail and road.

In conclusion, a unified government would not be able to support manufacturing among the aforementioned three elements within its budget system; however, the support of the international community would be a good solution. Powerful countries have “a strong economic and political interest in seeing Korea unified.”¹²³ The United States supports the idea that a unified Korea would be a democratic capitalist state.¹²⁴ If the unification is accomplished, the trade between the United States and NK would increase up to “approximately \$1 billion, with a possible additional \$300-425 million in services trade.”¹²⁵ In addition, the United States could peacefully remove WMDs and nuclear programs in NK.

Since it is the most supportive country to NK, China holds the key to achieve Korean unification. The aforementioned security and economic benefits for China would be able to attract China's support of Korean unification. From a geopolitical perspective, a peaceful atmosphere of unification would reduce the danger of military conflicts in East Asia. Since an investment is required to create a safer environment on the Korean peninsula, the geopolitical conflict would reduce. Conversely, the geo-economic value would increase: “China's expected benefit from business cooperation and investments with a unified Korea would be far greater than its incremental cost from the increased military deployment along the border after unification.”¹²⁶ In addition, according to Jin Jingi, the GDP of the three northeast Chinese provinces would achieve about 51 million

¹²³ Noland, “A Study to Analyze Cost-Benefits,” 144.

¹²⁴Ibid.

¹²⁵Ibid.

¹²⁶Pak, “China's Cost-Benefit Analysis,” 25.

RMB, their export would increase up to \$992 million, and retail consumer goods would be nearly 36 billion RMB if FDI in three provinces rises by 1% in 2020.¹²⁷

According to Snyder's theory, "the more dependent a state is, the more likely it is that the costs and risks of abandonment will outweigh the costs and risks of entrapment."¹²⁸ Since SK is the more dependent state in the alliance with the United States, it bears the risks of abandonment. In the case of Korean unification, the action of SK to gain the support of China can sometimes increase the risk of abandonment. To minimize the dilemma, the ROK government needs to match its strategic interests with that of the United States through continuous dialogue and communication. By stressing the benefits of unification to the international community as well as the United States, the ROK government is required to politicize its unification and be proactive in the process of unification.

China has a concern that a unified Korea will put forth a thoroughly pro-American policy. Moreover, territorial disputes and historical conflicts between China and Korea would also be potential conflict factors. In this regard, Korea needs to take a neutral attitude. While attracting China's support for Korean unification, it should be aware of the alliance dilemma with the United States. In addition, the ROK government needs to stress a peaceful unification plan, since NK's sudden collapse or a military conflict of the two Koreas could lead to a serious crisis in China. By stressing the benefits for China in terms of security and economy, the ROK government should lead NK to join the international community through the promotion of a sustainable relationship with China.

¹²⁷Jin, "Cost-Benefit Analysis of China due to Korean Unification," 58.

¹²⁸Glenn H. Snyder, "The Security Dilemma in Alliance Politics," 472.

LIST OF REFERENCES

Auerbach, Alan J. "The Fiscal Burden of Korean Reunification: A Generational Account Approach." Berkeley: University of California, Berkeley, Econometrics Laboratory, 2004. <http://eml.berkeley.edu/~auerbach/burden2.pdf>.

Bank of Korea. "Economic Statistics System of Bank of Korea." Accessed August 21, 2015. <http://ecos.bok.or.kr>.

Bennett, Bruce W. *The Challenge of North Korean Biological Weapons* (CT-401). Santa Monica, CA: RAND, 2013. <http://www.rand.org/pubs/testimonies/CT401>.

Bibow, See Jorg. "The Economic Consequences of German Unification: The Impact of Misguided Macroeconomic Policies." *Levy Institute Public Policy Brief* no. 67 (2001). <http://www.levyinstitute.org/pubs/hili67a.pdf>.

Boot, Max. "Why Is the Iran Deal Bad? Think North Korea." *LA Times*, July 21, 2015.

Brandt, Loren, Debin Ma, and Thomas G. Rawski. "From Divergence to Convergence: Reevaluating the History behind China's Economic Boom." *Journal of Economic Literature* 52, no. 1 (2014): 45–123. doi:10.1257/jel.52.1.45.

Cho, Dong-ho. "The Economic Cost and Benefit of Unification." In *Division Cost and Unification Cost*, edited by Dong-ho Cho. Seoul: Korea Institute of National Unification, 1997.

———. "Unification Benefit Is Larger than Unification Cost." Institute for Unification Education. Seoul: Ministry of Unification in Korea. Last modified May 2, 2011. <http://www.uniedu.go.kr/uniedu/pds/view.do?atclSn=1246&mcd=MC10001222&currPage=2&listScale=20&pageScale=10&inDivSet=PDS0000121>.

Cho, Han-bum, Kyuryoon Kim, Seok-jin Kim, Hyung-gi Kim, Mun-su Yang, Myung-jin Lee, Gang-taek Yim, Seung-chul Jung, and Sun-jae Hwang. *A Research on the Costs and Benefits of Korean Unification: Political, Social, and Economic Areas*. Seoul: Korea Institute for National Unification, 2013.

Choi, Yi-seop. "NK State-Owned Enterprises Estimates about 554." Financial Supervisory Service. Last modified February 28, 2015. http://www.fss.or.kr/fss/kr/promo/flash/flash_view.jsp?seqno=43457&no=1309&page=76&s_kind=&s_title=.

ESS. "Democratic People's Republic of Korea: Prevalence of Undernutrition." Rome: Food and Agriculture Organization of the United Nations. Accessed August 21, 2015.

http://faostat.fao.org/CountryProfiles/Country_Profile/Direct.aspx?lang=en&area=116.

Gabroussenko, Tatiana. "Calls for Self-Sacrifice in North Korean Creative Writing in the Late 1900s to 2000s." *The Journal of Korean Studies* 13, no. 1 (2008): 29–56.
https://muse.jhu.edu.libproxy.nps.edu/journals/journal_of_korean_studies/summary/v013/13.1.gabroussenko.html.

Foster, Peter. "North Korea Faces Famine: 'Tell the World We Are Starving.'" *Telegraph*, July 16, 2011. <http://www.telegraph.co.uk/news/worldnews/asia/northkorea/8641946/North-Korea-faces-famine-Tell-the-world-we-are-starving.html>.

Grabowski, Marcin. "Korean Unification Prospects and the United States' Policy." *Ad Americam: Journal of American Studies* 14 (2013): 37–49. ProQuest (1516048014).

Hong, Joon Seok. "The Economic Costs of Korean Reunification." *Spice Digest*, Fall 2001. http://fsi.stanford.edu/sites/default/files/Korean_Reunification.pdf.

Jin, Jingi. "Cost-Benefit Analysis of China due to Korean Unification." Seoul: Ministry of Unification. Last modified February 16, 2015.
<http://www.unikorea.go.kr/content.do?cmsid=3096&mode=view&page=&cid=42632>.

Kaesong Industrial District Management Committee. "The Enterprises Status." KIC Web. Accessed August 21, 2015. <https://www.kidmac.com/kor/contents.do?menuNo=100158>.

Kang, Moonsung, Hyung Joo Kim, Manjong Lee, Young Hoon Lee, Jong-Wha Lee, Hongsik Lee, Soon-chan Park, and Ju Hyun Pyun. *Gradual Economic Integration between South and North Korea and Economic Cooperation in Northeast Asia*. Seoul: Korea Institute for International Economic Policy, 2014.
http://www.kiep.go.kr/skin.jsp?bid=pub_main_view&grp=publication&num=186051&page=&tabValue=2.

Korea Institute for International Economic Policy and Korea Institute for Industrial Economics and Trade. *Korea Economic Community Promotion Initiative*. Seoul: Ministry of Unification, 2011.
<http://www.korea.kr/archive/expDocView.do?docId=30610>.

Kim, Ellen. "President Park Geun-hye's Dresden Declaration." *CSIS Asia Program Blog*. April 10, 2014. <http://cogitasia.com/president-park-geun-hyes-dresden-declaration>.

Kim, Kyung-sul, *South Korea and North Korea Energy Cooperation Ways Research*. Ulsan, ROK: Korea Energy Economics Institute, 2012.
https://www.nkis.re.kr:4445/researchReport_view.do?otpId=B41001800022429.

Kim, Kyuryoon, Byung-Duck Hwang, Kyung-suk Kim, Inhui Park, Byung-in Bae, Dong-hui Lee, Sang-Jun Lee, Hyewon Jun, Jaewoo Joo, and Sun-jik Hong. *New Approach to the Costs/Benefits of Korean Unification: Adopting Comprehensive Research Factors and Seeking Alternatives*. Seoul: Korea Institute for National Unification, 2011.
http://www.kinu.or.kr/report/report_04_01.jsp?page=1&num=104&mode=view&field=&text=&order=&dir=&bid=DATA05&ses=&category=2675.

Kim, Kyuryoon, and Hyunggi Kim. “Unification Funding and the Perception of Public.” Seoul, ROK: Korea Institute for National Unification. Last modified February 3, 2015. <http://www.unikorea.go.kr/content.do?cmsid=3096&mode=view&page=2&cid=42534>.

Kim, Won-bae. “Basic Design of Infrastructure Development in the Korean Peninsula.” Anyang, Gyeonggi-do: Korea Research Institute for Human Settlements (KRIHS). Last modified December 20, 2006.
<http://library.krihs.re.kr/upload/publication/publication/2006-43.pdf>.

Koblentz, Gregory. “Pathogens as Weapons: The International Security Implications of Biological Warfare,” *International Security* 28, no. 3 (Winter 2003/2004): 84–122. <http://belfercenter.ksg.harvard.edu/files/koblentz.pdf>.

Korean Workers’ Party, *Economic Dictionary II*. Pyongyang: Social Science, 1985.

Lange, Thomas, and Geoffrey Pugh, *The Economics of German Unification*. Cheltenham, UK: Edward Elgar, 1998.

Lim, Kang-taek. *Analysis of Economic Effect of NK’s War Industry*. Seoul: Korea Institute for National Unification, 2000.

Lee, Sangjun, Chun-gyu Kim, and Baek-jin Lee. “A Study on the 100 Major Inter-Korean Cooperation Issues Focusing on Spatial Development for the Korean Peninsula.” Anyang, Gyonggi-do: Korea Research Institute for Human Settlements. Last modified October 31, 2012.
http://library.krihs.re.kr/upload/publication/s_report/0000061622.pdf.

National Assembly Budget Office. “Economic Effect of Korean Unification.” Seoul: Ministry of Unification. Last modified December 22, 2014.
<http://www.unikorea.go.kr/content.do?cmsid=3096&mode=view&page=&cid=42368>.

———. “The Analysis of 2006 National Budget.” Seoul: National Assembly of ROK. Last modified October 25, 2005.

http://www.nabo.go.kr/Sub/04Etc/popReport.jsp?funcSUB=view&bid=19&arg_id=123#.

———. “The Long-Term Finance Prospect Analysis.” Seoul: National Assembly of ROK. Last modified June 25, 2012. http://www.nabo.go.kr/Sub/04Etc/popReport.jsp?funcSUB=view&bid=19&arg_id=3674.

———. “The Mid-Term Requirement in Agriculture and Fishery.” Seoul: National Assembly of ROK. Last modified August 27, 2012. http://www.nabo.go.kr/Sub/04Etc/popReport.jsp?funcSUB=view&bid=19&arg_id=3792.

———. “The Mid-Term Requirement in Industry and Energy.” Seoul: National Assembly of ROK. Last modified October 31, 2011. http://www.nabo.go.kr/Sub/04Etc/popReport.jsp?funcSUB=view&bid=19&arg_id=3330.

Noland, Marcus. “A Study to Analyze Cost-Benefits of the Reunification of Korean Peninsula to the United States.” Seoul: Ministry of Unification. Last modified February 16, 2015. <http://www.unikorea.go.kr/content.do?cmsid=3096&mode=view&page=&cid=42366>.

Noland, Marcus, Sherman Robinson, and Tao Wang. “Modeling Korean Unification.” *Journal of Comparative Economics* 28, no. 2 (2000): 400–21. <http://torpedo.nrl.navy.mil.libproxy.nps.edu/tu/ps/doc.html?dsn=2140832>.

Pak, Kiejoon. “China’s Cost-Benefit Analysis of a Unified Korea: South Korea’s Strategic Approaches.” *The Journal of East Asian Affairs* 26, no. 2 (2012): 25–52. ProQuest (1322715495).

Pollack, Jonathan D. “Is Xi Jinping Rethinking Korean Unification?” Presentation at the 3rd Korea Research Institute for Security-Brookings Joint Conference, Seoul, Korea, January 20, 2015. <http://www.brookings.edu/research/presentations/2015/01/20-xi-jinping-korean-unification-pollack>.

Rhee, Kang Suk. “Korea’s Unification: The Applicability of the German Experience.” *Asian Survey* 33, no. 4 (1993): 360–75.

Republic of Korea (ROK) Ministry of National Defense, *Defense White Paper* (MND, 2000–14). Seoul: ROK Ministry of National Defense.

Republic of Korea (ROK) Ministry of Strategy and Finance. “Summary of Budget for FY2015.” Seoul: ROK. Last modified January 30, 2015. <http://www.korea.kr/archive/expDocView.do?docId=35932>.

Republic of Korea (ROK) Ministry of Strategy and Finance. “The Budget of Korea in 2015.” ROK. Accessed March 19, 2015.

<http://www.budget.go.kr/front/web/datas/budget2015.do?mode=intro>.

Republic of Korea (ROK) Ministry of Unification. “Inter-Korean Cooperation Fund.” Seoul: Ministry of Unification. Accessed by August 23, 2015.

<http://www.unikorea.go.kr/content.do?cmsid=3100>.

———. “North Korea Macroeconomic.” North Korea Information Portal. Accessed August 22, 2015.

<http://nkinfo.unikorea.go.kr/nkp/overview/nkOverview.do?sumryMenuId=EC20>.

———. *North Korea Understanding*. Seoul: Institute for Unification Education, 2014.

Schirokauer, Conrad, and Donald Clark. *Modern East Asia: A Brief History*, 2nd ed. Boston: Houghton Mifflin, 2008.

Schmitz, Jonathan L. “The Economic Implications of Korean Unification.” Master’s thesis, Naval Postgraduate School, 2002. <http://hdl.handle.net/10945/5844>.

Seo, Jae-jun. “Kim Says that We Should Not Depend on Foreign Trade.” *News 1 of - Korea*, March 31, 2015. <http://news1.kr/articles/?2162601>.

Shen, Zuihua, and Yafeng Xia. *Mao and the Sino-Soviet Partnership, 1945–1959: A New History*. Lanham, MD: Lexington Books, 2015.

Shin, Jong-Ho, and Jae-Yong Chung. “The Four Major Rivers Restoration Project in South Korea.” *Proceeding of the Institution of Civil Engineers* 164, no. 1 (2011): 19–26. doi:10.1680/cien.2011.164.19.

Snyder, Glenn H. “The Security Dilemma in Alliance Politics.” *World Politics* 36, no. 4 (1984): 461–95. <http://www.jstor.org/stable/2010183>.

Statistics Korea. Korean Statistical Information Service (database). Accessed August 21, 2015.

http://kosis.kr/bukhan/statisticsList/statisticsList_01List.jsp?parentId=101_101BUKHANB01.1;101_101BUKHANB01_AA19.2;101_101BUKHANB01_AA19.3#SubCont.

Terry, Sue Mi. “A Korea Whole and Free.” *Foreign Affairs* 93, no. 4 (2014).

<https://www.foreignaffairs.com/articles/asia/2014-05-29/korea-whole-and-free>.

Terry, Sue Mi, and Max Boot. “The Wrong Lessons from North Korea.” *Foreign Affairs*, April 22, 2015. <https://www.foreignaffairs.com/articles/north-korea/2015-04-22/wrong-lessons-north-korea>.

The White House. *The Iran Nuclear Deal: What You Need to Know about the JCPOA*. July 14, 2015. https://www.whitehouse.gov/sites/default/files/docs/jcpoa_what_you_need_to_know.pdf.

Tiezzi, Shannon. "How China Could Benefit from a United Korea." *Diplomat*, January 14, 2014. <http://thediplomat.com/2014/01/how-china-could-benefit-from-a-united-korea>.

———. "South Korea's President and China's Military Parade." *Diplomat*, September 3, 2015. <http://thediplomat.com/2015/09/south-koreas-president-and-chinas-military-parade>.

U.S. Department of Defense. "Preventing Nuclear Proliferation and Nuclear Terrorism." In *Nuclear Posture Review Report*, 9–14. Washington, DC: Department of Defense, April 2010. <http://archive.defense.gov/npr/docs/2010%20Nuclear%20Posture%20Review%20Report.pdf>.

Vogel, Frederick J. *The Chemical Weapons Convention: Strategic Implications for the United States*. Carlisle Barracks, PA: U.S. Army War College, 1996. http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=AD_A309251.

Walker, Paul F. "Abolishing Chemical Weapons: Progress, Challenges, and Opportunities," *Arms Control Today* 40, no. 9 (November 2010): 22–30. <http://search.proquest.com/openview/cd82ff3fde274f40bb1a9ac702c8d8d1/1?pq-orignsite=gscholar>.

Wolf, Charles, Jr. "Korean Reunification: How It Might Come about and at What Cost." *Defence and Peace Economics* 17, no. 6 (December 2006): 681–90.

Wolf, Charles, Jr., and Kamiljon T. Akramov. *North Korean Paradoxes: Circumstances, Costs, and Consequences of Korean Unification*. Santa Monica: RAND, 2005.

Yang, Nakgu. "The Closure of the Kaesong Industrial Complex." *Asian Economy*, April 29, 2013. <http://www.asiae.co.kr/news/view.htm?idxno=2013042709333197493>.

You, Hun. "New Rural Budget Design," *The Jibang-haeng Jung* 21, no. 229 (1972): 50–59. http://kiss.kstudy.com/journal/thesis_name.asp?tname=kiss2002&key=1774959.

Zong, Jie, and Jeanne Batalova. "Korean Immigrants in the United States." Washington, DC: Migration Policy Institute. December 3, 2014. <http://www.migrationpolicy.org/article/korean-immigrants-united-states>.

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